SITE MANAGEMENT PLAN

for

1709 SURF AVENUE

Brooklyn, New York

NYSDEC Site Number: C224398

Prepared for:

Coney Island Associates Phase 3 LLC c/o BFC Partners
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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

Langan Project No.: 170747001
December 2025

LANGAN

CERTIFICATION STATEMENT

I, Jason J. Hayes, PE, certify I am currently a New York State (NYS) registered professional engineer (PE) as defined in Title 6 New York Codes, Rules and Regulations (6 NYCRR) Part 375 and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10) and Green Remediation (DER-31).



PE

DATE 12/19/2025

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List of Acronyms

6 NYCRR	Title 6 New York Codes, Rules and Regulations
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BMP	Best Management Practice
bgs	below grade surface
CAMP	Community Air Monitoring Plan
CHASP	Construction Health and Safety Plan
COC	Certificate of Completion
ConEd	Consolidated Edison, Inc.
CP	Commissioner Policy
CVOC	Chlorinated volatile organic compound
DER	Division of Environmental Remediation
DOT	Department of Transportation
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ESA	Environmental Site Assessment
FEMA	Federal Emergency Management Agency
HASP	Health and Safety Plan
HVAC	Heating, Ventilation, and Air Conditioning
HREC	Historical Recognized Environmental Condition
IC	Institutional Control
IU	Industrial Use
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCDHMH	New York City Department of Health and Mental Hygiene
OM&M	Operation, Maintenance and Monitoring
PAH	Polycyclic Aromatic Hydrocarbons
PBS	Petroleum Bulk Storage

PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PDI	Pre-Design Investigation
PE	Professional Engineer
PFAS	Per- and Polyfluoroalkyl Substances
PGW	Protection of Groundwater
PID	Photoionization Detector
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
REC	Recognized Environmental Condition
RI	Remedial Investigation
RP	Remedial Party
RSO	Remedial System Optimization
RURR	Restricted Use Restricted Residential
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SGV	Standards and Guidance Values
SMD	Sub-membrane Depressurization
SMP	Site Management Plan
SOE	Support of Excavation
SVI	Soil Vapor Intrusion
SVOC	Semivolatile Organic Compound
TCL	Target Compound List
UN	United Nations
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

This Site Management Plan (SMP) was prepared for the 1709 Surf Avenue site located in the Coney Island neighborhood of Brooklyn, New York (the site). The Brownfield Cleanup Program (BCP) site is identified as Brooklyn Borough Tax Block 7061, Lots 16, 20, 21, 27 and a portion of Lot 14. The BCP site (Site No. C224398) was remediated pursuant to the June 21, 2024 Brownfield Cleanup Agreement (BCA), Index No. C224398-05-24, by and between the New York State Department of Environmental Conservation (NYSDEC) and Coney Island Associates Phase 3 LLC (the Volunteer). The BCA was amended on September 9, 2025 to add Coney Island Phase 3 Moderate LLC as another Volunteer and as the beneficial and equitable owner, add Coney Island Phase III Housing Development Fund Corporation as the nominal fee owner, and designate Coney Island Associates Phase 3 LLC as a long-term lessee. A second BCA amendment was approved by NYSDEC on December 10, 2025 to reinstate an area on Lot 27 as eligible for tangible property credit.

The following provides a brief summary of the controls implemented for the site, as well as the inspections, monitoring, maintenance and reporting activities required by this SMP:

Site Identification: C224398 (1709 Surf Avenue, Brooklyn, NY 11224)

Institutional Controls:	1. The site may be used for Restricted-Residential use as defined in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial use as defined in 6 NYCRR Part 375-1.8(g)(2)(iii), and Industrial use as designed in 6 NYCRR Part 375-1.8(g)(2)(iv), although land use is subject to local zoning laws.
	2. The site may not be used for Unrestricted Use as defined in 6 NYCRR Part 375-1.8(g)(1)(i) or Residential (single family) Use as defined in 6 NYCRR Part 375-1.8(g)(2)(i) until remediation action objectives for groundwater and soil vapor are achieved and the Environmental Easement (EE) is extinguished, as approved by the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH).
	3. All Engineering Controls (ECs) must be operated and maintained as specified in this SMP.
	4. All ECs must be inspected at a frequency and in a manner defined in this SMP.

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	5. ECs may not be discontinued without an amendment or extinguishment of the EE, as approved by the NYSDEC and NYSDOH.
	6. The use of groundwater underlying the site is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene (NYCDOHMH) to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the NYSDEC.
	7. Groundwater monitoring and a soil vapor intrusion evaluation must be performed as defined in this SMP.
	8. Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP.
	9. On-site environmental monitoring and remedial devices, including but not limited to groundwater monitoring wells and sub-membrane depressurization (SMD) system equipment, must be protected and replaced as necessary to ensure proper functioning in the manner specified in this SMP.
	10. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP.
	11. Operation, maintenance, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP.
	12. Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the site owner to assure compliance with the restrictions identified by the EE.

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	13. The remedial party must provide all persons who acquire any interest in the site a complete copy of this SMP that the NYSDEC approves for the site and all NYSDEC-approved amendments to this SMP. The potential for vapor intrusion must be evaluated for any occupied buildings developed on the site, and any potential impacts that are identified must be monitored or mitigated.
	14. The remedial party is required to complete and submit to the NYSDEC a periodic certification of institutional controls (IC) and ECs in accordance with Part 375-1.8 (h)(3).
Engineering Controls:	SMD System – The system will be placed into operation to allow for building occupancy prior to completion of a soil vapor intrusion (SVI) evaluation that must be performed during the heating season. If the SVI evaluation results indicate the need for continued mitigation, the SMD system will remain in operation. If the building is enclosed, the SMD system is capped, and the heating, ventilation, and air conditioning (HVAC) is operational during the heating season, an SVI evaluation is conducted, and results indicate that mitigation is not required, Langan will request the NYSDEC and NYSDOH to terminate this SMP and extinguish the EE.

Inspections:	Frequency
1. Site-Wide Inspection	Annually and after severe weather events or until a Track 1 Cleanup is confirmed
2. SMD System	Annually and after required and/or unexpected shutdowns (until/if approval from the NYSDEC and NYSDOH is granted to decommission the SMD system)
Monitoring:	
1. SVI Evaluation for New Buildings	During the first heating season following building enclosure and HVAC operation

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2. Groundwater Monitoring Wells (RMW01 through RMW10)	Quarterly for at least one year following installation of post-remediation groundwater monitoring wells. If warranted by results, a request to decrease frequency or discontinue monitoring will be submitted to the NYSDEC
3. SMD System	Annually (only if the SVI evaluation determines that continued operation is necessary)
Maintenance:	
1. SMD System	As needed
Reporting:	
1. Quarterly Groundwater Monitoring Reports	Quarterly for at least one year following installation of post-remediation groundwater monitoring wells (will also be included in the periodic review report [PRR]). If warranted by results, a request to reduce frequency or discontinue monitoring will be submitted to NYSDEC
2. Periodic Review Report	First due 16 months after COC, then annually, or as otherwise determined by the NYSDEC until a Track 1 Cleanup is confirmed

Further descriptions of the above requirements are provided in detail in the latter sections of this SMP.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the 1709 Surf Avenue site located in the Coney Island neighborhood of Brooklyn, New York (hereinafter referred to as the "site"). The site is currently enrolled in the New York State (NYS) Brownfield Cleanup Program (BCP; Site No. C224398), which is administered by the New York State Department of Environmental Conservation (NYSDEC). Coney Island Associates Phase 3 LLC (the Volunteer) entered into a Brownfield Cleanup Agreement (BCA), Index No. C224398-05-24, on June 21, 2024 with the NYSDEC to remediate the site. The BCA was amended on September 9, 2025 to add Coney Island Phase 3 Moderate LLC as another Volunteer and as the beneficial and equitable owner, add Coney Island Phase III Housing Development Fund Corporation as the nominal fee owner, and designate Coney Island Associates Phase 3 LLC as a long-term lessee.

Additional sampling was conducted on May 1 and May 27, 2025 in the southern part of the site within the area where petroleum-related soil and groundwater were encountered during the remedial investigation (RI), which the NYSDEC had initially determined to be partially ineligible for BCP tangible property credits (TPC; herein defined as "TPC exclusion area") per the BCA. Samples were collected from soil exhibiting petroleum-related nuisance conditions within the TPC exclusion area and were analyzed for Target Compound List (TCL)/NYSDEC Part 375-volatile organic compounds (VOCs). Soil sample analytical results and supporting documentation are included in Appendix A of the FER and were provided to the NYSDEC. Based on this additional sampling data demonstrating that this area was not previously remediated for its then-intended use, the TPC eligibility of a former TPC exclusion area on Lot 27 of the site was reinstated by NYSDEC and the BCA was amended again on December 10, 2025.

A site location map and site plan showing the site location and boundaries are provided as Figures 1 and 2, respectively. The boundaries of the site are described further in the metes and bounds site description that is part of the Environmental Easement (EE), which is included as Appendix A.

Remediation was completed in accordance with the NYSDEC-approved November 20, 2024 Remedial Action Work Plan (RAWP) and the March 27, 2025 In-situ Groundwater Treatment Remedial Design Plan prepared by Langan. Site remediation included removal of all soil exceeding the NYSDEC Title 6 of the New York Codes, Rules and Regulation (6 NYCRR) Part 375 Unrestricted Use Soil Cleanup Objectives (UU SCOs), and completion of in-situ groundwater treatment to remove residual VOCs in groundwater exceeding the

NYCRR Part 703.5 Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values for Class GA water (collectively known as NYSDEC SGVs). After completion of the remedial work, residual contaminated soil vapor and groundwater may remain at the site, which is hereafter referred to as "potential remaining contamination". Institutional and Engineering Controls (ICs and ECs) have been incorporated into the site remedy to control exposure to potential remaining contamination in the event that mitigation would be necessary to protect public health and the environment, provided that there is strict adherence to this SMP by site owners, employees, occupants, contractors and site visitors. An EE granted to the NYSDEC, and recorded with the Office of the City Register of the City of New York, requires compliance with this SMP and all ECs and ICs placed on the site.

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan), on behalf of Coney Island Associates Phase 3 LLC, prepared this SMP in accordance with the requirements of the NYSDEC's Division of Environmental Remediation (DER)-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP establishes protocols to manage potential remaining contamination at the site until the EE is extinguished in accordance with Environmental Conservation Law (ECL) Article 71, Title 36. This SMP has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the EE and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

This SMP details the site-specific implementation procedures that are required by the EE. Failure to properly implement this SMP is a violation of the EE, which is grounds for revocation of the Certificate of Completion (COC). Failure to comply with this SMP is also a violation of ECL, Title 6 New York Codes, Rules and Regulations (6 NYCRR) Part 375 and the BCA (Index #C224398-05-24; Site #C224398) for the site, and thereby subject to applicable penalties.

All reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the site is provided in Appendix B of this SMP.

1.2 Revisions and Alterations

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. The NYSDEC can also make changes to this SMP or request revisions from the remedial party. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shutdown of a remedial system, post-

remedial removal of contaminated sediment or soil, or other significant change to the site conditions. All approved alterations must conform with Article 145 Section 7209 of the Education Law regarding the application of professional seals and alterations. For example, any changes to as-built drawings must be stamped by a New York State PE. In accordance with the EE for the site, the NYSDEC project manager will provide a notice of any approved changes to this SMP and append these notices to this SMP that is retained in the agency's files.

1.3 Notifications

Notifications will be submitted by the site owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

1. 60-day advance notice of any proposed changes in site use that are required under the terms of the BCA, 6 NYCRR Part 375 and/or ECL
2. 7-day advance notice of any field activity associated with the remedial program
3. 15-day advance notice of any proposed ground-intrusive activity - if the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above mentioned 60-day advance notice is also required.
4. Notice within 48 hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect
5. Notice within 48 hours of any non-routine maintenance activities
6. Verbal notice by noon of the following day of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public
7. Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs

Any change in the ownership of the site or the responsibility for implementing this SMP will include the following notifications:

8. At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the BCA and all approved work plans and reports, including this SMP.

9. Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC

The following table includes contact information for the above notifications. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B. Responsibilities of the owner and Remedial Party are provided in Appendix C.

Notifications*

Title	**Contact Information**	**Required Notification****
Site Owner and Remedial Party	Donald Capoccia 718-422-9999 Email: dac@bfcnyc.com	
Remedial Engineer	Jason Hayes, PE, LEED, AP 212-479-5427 Email: jahayes@langan.com	
Program Manager	Brian Gochenaur, QEP 212-479-5479 Email: bgochenaur@langan.com	
Project Manager	Lamees Esmail, PE 212-479-5499 Email: lesmail@langan.com	
NYSDEC Project Manager	Meghan Medwid 518-402-8610 Email: meghan.medwid@dec.ny.gov	All Notifications
NYSDEC Section Chief	Lisa Gorton 518-402-9574 Email: lisa.gorton@dec.ny.gov	All Notifications
NYSDEC Site Control	Kelly Lewandowski 518-402-9543 Email: kelly.lewandowski@dec.ny.gov	Notifications 1 and 8
NYSDOH Project Manager	Angela Martin 518-473-4671 Email: angela.martin@health.ny.gov; beei@health.ny.gov	Notifications 4, 6, and 7

* Note: Notifications are subject to change and will be updated as necessary.

** Note: Numbers in this column reference the numbered bullets in the notification list in this section.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The about 65,800-square-foot (1.511 acre) site is in the Coney Island neighborhood of Brooklyn, New York and is identified as Block 7061, Lots 16, 20, 21, 27 and a portion of Lot 14 on the Kings County Tax Map. Block 7061 is bound by Mermaid Avenue to the north, West 17th Street to the east, Surf Avenue to the south, and West 19th Street to the west. The site is being redeveloped into a 12-story, mixed-use residential and commercial building with open-air parking. A site location map and site layout map are provided as Figures 1 and 2, respectively. The boundaries of the site are more fully described in the EE, which is included as Appendix A.

The owner of the site at the time of issuance of this SMP, which is the party responsible for implementing this SMP under the BCA, is:

Coney Island Phase 3 Moderate LLC

c/o BFC Partners, 150 Myrtle Avenue, Suite 2

Brooklyn, New York 11201

2.2 Physical Setting

2.2.1 Land Use

The site is zoned as residential within a Medium-Density Contextual Residence District (R7X) and the Special Coney Island District (CI). According to the New York City Planning Commission, "R7 districts are medium-density apartment house districts mapped in much of the Bronx as well as the Upper West Side in Manhattan and Brighton Beach in Brooklyn. The height factor regulations for R7 districts encourage lower apartment buildings on smaller zoning lots and, on larger lots, taller buildings with less lot coverage."

The properties adjoining the site and in the neighborhood surrounding the site primarily include public parks, vacant properties, parking lots, and residential, commercial, and public buildings. The site is adjoined by eight 2- to 4-story mixed-use residential and commercial buildings, and a one-story commercial building to the north; West 17th Street followed by vacant land, and a 10-story building to the east; Surf Avenue followed by Maimonides Park to the south; and West 19th Street followed by a 16-story mixed-use residential and commercial building to the west.

2.2.2 Geology

The site is in the southern part of the Coney Island neighborhood in Brooklyn, New York, which is a peninsula on the southwestern end of Long Island, New York. Soil and bedrock

stratigraphy throughout this part of Brooklyn typically consist of a layer of non-native fill that overlies glacial till, decomposed bedrock, and bedrock. The glacial till deposits, also known as ground moraine, are a widespread dense layer of till material that typically consists of clay, silt, sand, gravel and boulders.

Environmental investigations performed prior to site redevelopment identified non-native fill consisting predominantly of brown to gray or black, fine- to medium-grained sand with varying amounts of silt, clay, gravel, concrete, asphalt, wood, glass, roots, and brick. Non-native fill was encountered across the site extending to depths between about 1.5 and 10 feet below grade surface (bgs). The non-native fill is underlain by native soil consisting predominantly of brown to gray, fine- to medium-grained sand with varying amounts of silt that extended to the termination depth of each boring throughout the site during the May/June 2024 RI completed by Langan. Historic boring logs from previous investigations are included in Appendix C of the Remedial Investigation Report (RIR) provided in Appendix D of this SMP.

2.2.3 Hydrogeology

Groundwater elevations (el.) range from about el. 0.68 to 1.06 across the site[1]. The groundwater elevation is highest in the southern part of the site. A groundwater contour map is provided as Figure 3. Groundwater monitoring well construction logs are provided in Appendix E.

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the site. Full titles for each of the reports referenced below are provided in Section 8.0 – References.

2.3.1 Site History

The site has been in a densely developed urban area characterized by commercial, residential, and institutional uses since at least 1895. The site was historically used for various residential, institutional, and commercial purposes including a railroad (1895 to 1950) on Lot 14; a hotel (1895) on Lots 16, 20 and 21; a school (1906) on Lot 16; an unspecified store (1906 to 1950) and a drycleaner (1965 to 2007) on Lot 20; unspecified stores on Lot 21 (1906 to 1989); and a gasoline filling station with petroleum bulk storage, auto service station (1968 to 2003) and a car wash (1991 to 2003) on Lot 27. Between

[1] Elevations in this RAWP refer to North American Vertical Datum of 1988 (NAVD88), which is about 1.1 feet above mean sea level at Sandy Hook, New Jersey.

1994 and 2007, the buildings on Lots 16, 20, 21, and 27 were vacated and all structures were razed. By 2009, all lots had been paved for use as a parking lot. Lot 16 was subsequently redeveloped with a one-story community health center in 2015. Lots 14, 20, 21, and 27 continued to be used for parking and construction equipment storage.

Lot 27 was historically used as a gasoline filling station and auto repair facility. This lot is associated with NYSDEC Spill No. 0302857, which was reported on June 17, 2003, after petroleum impacts were identified in soil and groundwater during the excavation and removal of twenty underground storage tanks (UST) associated with the former gasoline filling station. These USTs are registered under NYSDEC Petroleum Bulk Storage (PBS) No. 2-350486 and were removed on June 1, 2003. According to the administrative record for Spill No. 0302857, some impacted soil and free product were removed during tank removal. The closed listing of Spill No. 0302857 from the NYSDEC Spill Incidents Database Search is included in Appendix F.

2.3.2 Previous Environmental Reports

The investigations listed below describe original site conditions prior to implementation of the remedy and were performed to characterize the nature and extent of contamination, and to fill data gaps to confirm environmental conditions and subsurface geology to develop remediation and mitigation strategies at the site. The RIR and Phase I Environmental Site Assessment (ESA) prepared by Langan are listed below and provided in Appendix E. Previous reports including the Phase II Environmental Site Investigation (ESI) Letter prepared by Fleming Lee Shue, the Phase I ESA and the Phase II ESI prepared by Hillmann, and the Limited Subsurface Investigation (LSI) report prepared by Langan are appended to the RIR as Appendix B and listed below.

- March 30, 2009 Phase II ESI Letter for Block 7061, Lot 27, prepared by Fleming Lee Shue (FLS)
- June 11, 2018 Phase I ESA for Block 7061, Lots 14, 20, & 27, prepared by Hillmann Consulting (Hillmann)
- June 13, 2018 Phase II ESI Report for Block 7061, Lots 14, 20, & 27, prepared by Hillmann
- March 1, 2023 LSI Report for the site, prepared by Langan
- August 14, 2024 RIR for the site, prepared by Langan
- January 26, 2025 Phase I ESA for the site, prepared by Langan

Lot 27 was historically used as a filling station and auto repair facility. This lot is associated with NYSDEC Spill No. 0302857, which was reported on June 17, 2003, after petroleum

impacts were identified in soil and groundwater during the excavation and removal of twenty UST associated with the former gasoline filling station. These USTs are registered under NYSDEC PBS No. 2-350486 and were removed on June 1, 2003. According to the administrative record for Spill No. 0302857, some impacted soil and free product were removed during tank removal. The March 2009 Phase II ESI Letter prepared by FLS indicated that petroleum-related VOCs and one semivolatile organic compound (SVOC) (naphthalene) were detected in groundwater above the SGVs. Total xylenes were detected in soil between 4 and 6 feet bgs in exceedance of the Title 6 NYCRR Part 375 Industrial Use (IU) SCO.

The 2018 Phase I ESA performed by Hillman contained previous reports prepared by FLS, including the November 2010 Supplemental Subsurface Site Investigation Report. This Report found that petroleum-related VOCs and SVOCs were not detected above respective SGVs in groundwater on Lot 27. The spill was subsequently administratively closed by the NYSDEC on December 20, 2011, based on the UST removal and observed lack of petroleum-related compounds in site groundwater. SVOCs were detected in soil at concentrations above Title 6 NYCRR Part 375 UU SCOs during the 2010 investigation and were attributed to the presence of fill. During the June 2018 Phase II ESI performed by Hillmann, pesticides and metals were detected in soil above the Title 6 NYCRR Part 375 UU SCOs and were also attributed to the presence of fill.

The 2010 FLS report also indicated that elevated concentrations of tetrachloroethene (PCE) and trichloroethene (TCE) were detected in groundwater during a Phase II ESI performed in 2002 (report not provided). The source of the chlorinated volatile organic compounds (CVOC) was attributed to the historical drycleaner on Lot 20. PCE was also detected above the SGV in groundwater during the 2010 subsurface site investigation.

Langan completed an LSI in January 2023 and prepared an RIR in August 2024 to define the nature and extent soil, soil vapor, and groundwater contamination at or emanating from the site. The RIR findings are summarized below and incorporate the data from the LSI. Analytical results for soil and groundwater are depicted in Tables 1A, 1B and 1C and Figures 4A, 4B, and 4C.

- Geophysical Survey (LSI): The geophysical survey identified two anomalies consistent with potential USTs (Lot 21 and Lot 27) and one anomaly presumed to be a suspect vault in the south-central part of the site (Lot 27).
- Stratigraphy: The stratigraphy of the site consists of a fill layer that extends to between 1.5 to 10 feet bgs. The fill predominantly consists of brown-to-gray or black, fine-to-medium-grained sand with varying amounts of silt, clay, gravel, concrete, asphalt, wood, glass, roots, and brick. Native soil that predominantly

consists of brown-to-gray, fine-to-medium-grained sand with varying amounts of silt extended to the termination depth of each boring. Bedrock was not encountered in any of the soil borings and is expected to be greater than 600 feet bgs.

- Petroleum-Impacted Soil, Groundwater, and Soil Vapor: Petroleum impacts were identified in soil, groundwater, and soil vapor in the vicinity of the former auto service station and gasoline filling station associated with the administratively closed NYSDEC Spill No. 0302857 on Lot 27. Although the spill was administratively closed on December 20, 2011, petroleum-impacted soil exceeding the UU, Protection of Groundwater (PGW), and/or Restricted Use Restricted Residential (RURR) SCOs and groundwater exceeding the SGVs remain across roughly 10% of the southern part of the site (5,300 square feet) to depths between 12 and 16 feet bgs. The petroleum impacts were vertically and horizontally delineated and do not appear to be migrating off-site.
- CVOC-Impacted Soil, Groundwater, and Soil Vapor: CVOC-impacted groundwater was identified during previous investigations and is likely the result of chemical releases associated with the historical use of Lot 20 as a drycleaner. Except for PCE in one boring, CVOCs were not detected above the UU, PGW, and/or RURR SCOs in soil. CVOCs were also not detected above the SGVs in groundwater during the RI or LSI.
- Soil and Groundwater Impacts from Historical Operations: SVOCs, pesticides, and metals were detected at concentrations above the Part 375 UU, PGW, and/or RURR SCOs. SVOCs and metals are related to either historical site operations or historical development and backfilling activities at the site. Pesticides detected in surficial soil samples may be the result of historical pesticide application. Non-petroleum-related SVOCs detected in groundwater above the SGVs are attributed to entrained fill sediment. Naturally occurring metals were detected in groundwater throughout the site at concentrations above the SGVs. The presence of total and dissolved arsenic in groundwater, and per- and polyfluoroalkyl substances (PFAS) in soil and groundwater are attributed to an off-site source, as these compounds were not known to be used by any historical on-site operations.

Langan prepared a January 26, 2025 Phase I ESA on behalf of Coney Island Associates Phase 3 LLC c/o BFC Partners. The Phase I ESA identified the known soil, groundwater, and soil vapor contamination (summarized in the RIR) as a recognized environmental condition (REC). A closed, historic spill on Lot 16 (NYSDEC Spill No. 1409724) that involved a release of 5 to 10 gallons of No. 2 fuel oil during the removal of two 550-gallon

USTs during development of the current one-story community health center was identified as a historical recognized environmental condition (HREC).

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the site as listed in the Decision Document (DD) dated December 17, 2024 are as follows:

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

RAOs for Environmental Protection

- Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of ground or surface water contamination.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

The remedy was implemented in accordance with the NYSDEC-approved RAWP. All soil remaining at the site following remediation meets the Track 1 Unrestricted Use SCOs. The Track 1 SCOs are provided in Table 2.

2.4.1 Summary of Remedial Actions

The remedy was implemented in accordance with the NYSDEC-approved November 20, 2024 RAWP and the March 27, 2025 In-situ Groundwater Treatment Remedial Design Plan (a copy of the plan and approval are included in Appendix D). All soil remaining at the site following remediation meets the Track 1 UU SCOs.

The first quarterly groundwater sampling event was completed in September 2025, following the installation of post-remediation groundwater monitoring wells, to confirm a Track 1 remedy was achieved. Post-excavation groundwater samples were collected and analyzed for petroleum-related VOCs that exceeded applicable SCOs in soil and were identified in groundwater during the RI. No VOC concentrations exceeding the SGVs were identified during the first quarterly groundwater sampling event.

An SMD system is being constructed during site development and will be activated to allow for building occupancy prior to completion of an SVI evaluation, which must be performed during the heating season. The results and recommendations of the forthcoming SVI evaluation will be summarized in a report that will be submitted to NYSDEC for review. If the SVI evaluation results indicate the need for continued mitigation, the SMD system will remain in operation. If the building is enclosed, the SMD system is capped, and the heating, ventilation, and air conditioning (HVAC) is operational during the heating season, Langan may conduct an SVI evaluation prior to building occupancy. An SVI evaluation work plan will be submitted to the NYSDEC and NYSDOH for review and approval prior to implementation of the SVI. If the results of the SVI evaluation indicate that mitigation is not required, then Langan will request approval to decommission the SMD from the NYSDEC and NYSDOH and it will no longer be considered an EC. A conditional Track 1 Certificate of Completion (COC) will be issued by the NYSDEC until VOCs in groundwater samples do not exceed the NYSDEC SGVs or have become asymptotic at an acceptable level and SVI evaluation results indicate that a SMD system is no longer required; a Track 1 COC will be confirmed if these remedial action objectives are achieved within five years of COC issuance.

The following activities were completed to date to achieve RAOs:

- Completion of further synoptic gauging during a pre-design investigation (PDI) on January 22, 2025 following issuance of the DD and prior to the start of RAWP implementation

- Development and implementation of a Construction Health and Safety Plan (CHASP) for the protection of on-site workers, and a Community Air Monitoring Plan (CAMP) for protection of community/residents and the environment during remediation and construction activities
- Decommissioning of existing groundwater monitoring wells in accordance with NYSDEC Commissioner's Policy (CP)-43
- Design and construction of support of excavation (SOE) systems to facilitate the recommended Track 1 remedy (e.g., removal of soil and fill that exceeded the UU SCOs)
- Demolition of the former community health center to facilitate remedial excavation (completed in August 2025; the Remediation Engineer [RE] was not responsible for documenting and certifying compliance of demolition activities with city, state, and/or federal requirements)
- Implementation of soil erosion, pollution and sediment control measures in compliance with applicable laws and regulations
- Dewatering to accommodate the removal of material that exceeded the UU SCOs
- Removal, decommissioning, and off-site disposal of one 550-gallon UST and one 3,000-gallon UST in accordance with DER-10, 6 NYCRR Part 613.9, NYSDEC CP-51, and other applicable NYSDEC UST closure requirements. Former UST locations are shown on Figure 5.
- Excavation, stockpiling, off-site transport, and disposal of about 21,797.63 tons of soil that exceeded the UU SCOs, as defined by 6 NYCRR Part 375-6.8. Remedial excavation to depths ranging from 2 to 16 feet bgs across the site footprint. Remedial excavation areas and corresponding depths are shown in Figures 5 and 6.
- Screening for indications of contamination (by visual means, odor, and monitoring with a photoionization detector [PID]) of excavated material during intrusive site work
- Collection and analysis of confirmation soil samples in accordance with DER-10 to confirm a Track 1 remedy was achieved; over-excavation beyond development depth was completed as necessary to meet UU SCOs across the site
- Importation of 19,923.15 tons of clean fill (i.e., material meeting UU SCOs as defined by 6 NYCRR Part 375-6.5), virgin stone, recycled concrete aggregate (RCA), or virgin, native crushed stone to backfill over-excavated areas to development depth or for use in ramps or sub-base

- Completion of in-situ groundwater treatment during RAWP implementation. Quarterly groundwater monitoring will be implemented for at least one year following installation of the post-remediation groundwater monitoring wells. During the first groundwater sampling event in September 2025, no NYSDEC Commissioner's Policy (CP)-51-list VOC concentrations exceeded the SGVs. A conditional Track 1 COC will be issued until RAOs for groundwater are achieved within five years of COC issuance.
- Installation of an SMD system that will be placed into operation to allow for building occupancy prior to completion of an SVI evaluation that must be performed with an operational HVAC system and during the heating season - If the SVI evaluation results indicate the need for continued mitigation, the SMD system will remain in operation. If results indicate that mitigation is not required, the system will be made passive and Langan will request to the NYSDEC and NYSDOH that the SMP is terminated and the EE is extinguished.

2.4.2 In-Situ Groundwater Treatment

Elevated PID readings and petroleum-related VOC and naphthalene concentrations above the SGVs were identified in groundwater during the RI. An in-situ groundwater remediation program was implemented to address potential residual petroleum-related VOC impacts in groundwater and to facilitate the remedial excavation to achieve UU SCOs.

The in-situ groundwater treatment program was implemented from June 23 to June 30, 2025, to remediate potential petroleum-related VOC impacts in groundwater following removal of source material in soil as discussed in the RAWP and the In-Situ Groundwater Treatment Remedial Design Plan. The groundwater treatment included the application of PetroFix™ remediation fluid and Electron Acceptor (EA) Blend, via soil mixing in an approximately 11,700-square-foot area within the southern part of the site from approximately 6 to 16 feet bgs. PetroFix™ is a remedial agent that promotes the removal of petroleum-related VOCs through sorption, and the EA blend stimulates anaerobic biological degradation. PetroFix™ was diluted with potable hydrant water and applied to the dry excavation area in depth intervals starting at 16, 10, 9, 8 and 6 feet bgs. A total of 2,500 gallons of PetroFix™, 1,240 pounds of EA blend, and 6,100 gallons of potable water were applied to the in-situ groundwater treatment area in the southern part of the site.

2.4.3 Post-Remediation Groundwater Well Installation

Ten post-remediation groundwater monitoring wells (RMW01 through RMW10) were installed following remedial excavation and backfilling from September 10 to 12, 2025 to

document the effectiveness of the in-situ groundwater treatment program implemented at the site. RMW01 through RMW03, RMW06, RMW07, and RMW10 were damaged during construction activities and re-installed on December 1, 2025.

Monitoring wells were installed by Lakewood Environmental Service Corp (Lakewood) of Smithtown, New York using a Geoprobe® 6620 DT or 6610DT and are constructed with 10 feet of 2-inch-diameter, schedule 40 polyvinyl chloride (PVC), 0.02-inch slotted pre-packed screens attached to solid risers. Monitoring wells RMW01 through RMW10 were installed from surface grade to between about 15 and 20 feet bgs. In addition to pre-packed sand, each well's approximately 4-inch-diameter annulus also contained No. 1 filter sand between the bottom of the well to about two feet above the screened interval, followed by a bentonite seal and grout to surface grade. The monitoring wells were capped with a "J" plug and finished with flush-mounted well covers incorporated in the new concrete building slab. Upon installation, the wells were developed using a submersible Monsoon® pump until purged groundwater appeared clear and were then allowed to stabilize until the first quarterly sampling event performed on September 18 and 19, 2025.

Post-remediation groundwater monitoring wells will be surveyed once they are finished with flush-mounted well covers incorporated in the new concrete building slab. Following the survey including top-of-casing elevations, depth to groundwater measurements will be used to develop a post-remediation groundwater contour map.

2.5 Remaining Contamination

2.5.1 Soil

Endpoint samples have confirmed that all soil remaining in place meets the UU SCOs. If a confirmation soil sample initially failed to meet UU SCOs, the entire 30-foot by 30-foot grid represented by that sample was over-excavated by about one to three feet and resampled for the failed parameters until the Track 1 UU SCOs were achieved. Over-excavation was required in several locations across the site due to concentrations of pesticides, SVOCs, and metals initially above the UU SCOs. Confirmation endpoint sample locations and over-excavation depths are provided in Figure 5 and remedial excavation locations are provided in Figure 6. Confirmation endpoint sample analytical data is provided in Table 3A and Table 3B.

Four VOCs, 23 SVOCs, eight pesticides, total PCBs, and 24 metals were all detected in confirmation soil samples, but at concentrations below the UU SCOs. An excavation work plan (EWP) is not required since all remaining soil meets UU SCOs.

2.5.2 Groundwater

As part of the Remedial Action, petroleum-impacted source material was removed. An in-situ groundwater treatment was completed via the application of PetroFix™ remediation fluid and EA Blend, as discussed in Section 2.4.2, and a network of ten post-remediation monitoring wells were installed as part of the redevelopment construction. The contaminants of concern for groundwater at the site include petroleum-related VOCs that exceeded applicable SCOs in soil and were identified in groundwater during the RI. During the first groundwater sampling event in September 2025, petroleum-related VOCs were analyzed in groundwater, and no VOCs exceeded the SGVs. Groundwater monitoring will continue quarterly for at least the first year following installation of post-remediation groundwater monitoring wells to monitor performance of the in-situ groundwater treatment and attainment of the groundwater RAOs. Post-remedial groundwater sample analytical results from the first quarterly groundwater sampling event are provided in Table 4 and Figure 7.

2.5.3 Soil Vapor

PCE, TCE, and/or vinyl chloride were detected in soil vapor samples on Lots 16 and 27 during the RI at concentrations that were associated with historical site operation as an auto service station and/or drycleaner. Petroleum-related VOCs (1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 2,2,4-trimethylpentane, cyclohexane, ethylbenzene, m,p-xylene, n-heptane, n-hexane, and o-xylene) were detected in soil vapor on Lots 21 and 27 and were attributed to residual contamination associated with a release from the gasoline filling station's former petroleum bulk storage.

An SMD system is being constructed during site development and will be activated to allow for building occupancy prior to completion of an SVI evaluation, which must be performed during the heating season. The SVI evaluation will include the concurrent collection of co-located indoor air and sub-slab soil vapor samples from the vacuum monitoring points (VMPs) installed within the SMD system. An SVI evaluation work plan will be submitted to the NYSDEC and NYSDOH for review and approval prior to implementation. The results and recommendations of the SVI evaluation will be summarized in a forthcoming report that will be submitted to NYSDEC and NYSDOH for review. If the SVI evaluation results indicate the need for continued mitigation, the SMD system will remain in operation.

If the building is enclosed, the SMD system is capped, and the HVAC is operational during the heating season, Langan may conduct an SVI evaluation prior to building occupancy. If

the results of the SVI evaluation indicate that mitigation is not required, then Langan will request approval to decommission the SMD from the NYSDEC and NYSDOH.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

ICs are required to protect human health and the environment until forthcoming SVI evaluation and groundwater sampling results indicate that a SMD system is no longer required and groundwater monitoring can be discontinued. This IC/EC Plan describes the procedures for implementation and management of all IC/ECs at the site. The IC/EC Plan is one component of this SMP and is subject to revision by the NYSDEC project manager.

This plan provides:

- A description of all IC/ECs on the site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the EE;
- A description of the controls to be evaluated during each required inspection and periodic review; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the site remedy, as determined by the NYSDEC project manager.

3.2 Institutional Controls

A series of ICs is required by the DD to:

1. Implement, maintain and monitor EC systems;
2. Prevent future exposure to remaining contamination; and,
3. Limit the use and development of the site to restricted-residential, commercial, and industrial uses only until extinguishment of the EE.

Adherence to these ICs on the site is required by the EE and will be implemented under this SMP. ICs identified in the EE may not be discontinued without an amendment to or extinguishment of the EE, as approved by NYSDEC and NYSDOH. The IC boundaries are shown on Figure 6. These ICs are:

- The site may be used for Restricted-Residential use as defined in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial use as defined in 6 NYCRR Part 375-1.8(g)(2)(iii), and Industrial use as designed in 6 NYCRR Part 375-1.8(g)(2)(iv), although land use is subject to local zoning laws;

- The site may not be used for Unrestricted Uses as defined in 6 NYCRR Part 375-1.8(g)(1)(i) or Residential Uses as defined in 6 NYCRR Part 375-1.8(g)(2)(i) until remediation action objectives for soil vapor and groundwater are achieved and the EE is extinguished, as approved by the NYSDEC and NYSDOH;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in this SMP;
- ECs may not be discontinued without an amendment or extinguishment of the EE, as approved by the NYSDEC and NYSDOH;
- The use of groundwater underlying the site is prohibited without completion of necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene (NYCDOHMH) to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the NYSDOH;
- Groundwater monitoring and a soil vapor intrusion evaluation must be performed as defined in this SMP.
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- On-site environmental monitoring and remedial devices, including but not limited to groundwater monitoring wells and SMD system equipment, must be protected and replaced as necessary to support proper functioning in the manner specified in this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the site owner to assure compliance with the restrictions identified by the EE;
- The remedial party must provide all persons who acquire any interest in the site a complete copy of this NYSDEC-approved SMP for the site and all NYSDEC-approved amendments to this SMP;

- Compliance with the EE by the Grantee and the Grantee's successors and adherence of all elements of this SMP is required; and
- The remedial party is required to complete and submit to the NYSDEC a periodic certification of ICs/ECs in accordance with Part 375-1.8 (h)(3).

3.3 Engineering Controls

3.3.1 Sub-Membrane Depressurization System

An SMD system is being constructed as part of site development. The SMD system creates a depressurized (low vacuum) field beneath the floor slab by extracting the sub-slab air with a fan assembly. This low vacuum field reverses the potential natural pressure gradient and diverts potentially impacted vapors from the subsurface of the building to the atmosphere above its rooftop, thereby reducing the potential for vapor intrusion. The design for the SMD system was based on the NYSDOH's "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (February 2024) (NYSDOH Soil Vapor Guidance), the United States Environmental Protection Agency (USEPA) Draft Guidance Document EPA/6251R-92 for the sub-slab depressurization of large buildings and schools, and the NYC Administrative Code Section MC 512: Subslab Soil Exhaust Systems.

The SMD system was installed and is comprised of four noncontiguous networks of sub-membrane collection pipes constructed of 4-inch-diameter, schedule 80 PVC perforated piping. The perforated piping sections were connected to 4-inch-diameter, schedule 80 PVC solid sub-header lines that manifold to 4-inch-diameter solid, metal riser pipes. The piping is installed beneath the foundation slab within a continuous permeable aggregate layer across the area comprised of 0.75-inch quarry stone placed above a geotextile fabric. The aggregate layer is covered by a vapor barrier/waterproofing membrane system and consists of Aussie Skin 550G® waterproofing membrane and associated sealing tape. The vapor barrier/waterproofing membrane extends laterally under the entire building footprint and vertically around the sub-grade portions of the perimeter foundation walls. The piping systems each connect to a 4-inch-diameter metal riser pipe (per NYC Building and Mechanical Code) that penetrate the building slab and direct soil vapor to blowers on the building roof. There is no proposed accessory or recreational space near the exhaust locations, and the SMD system exhaust points are located at least 10 feet from air intakes or operable windows. Eight VMPs (VMP-1 to VMP-8) are installed within the gravel layer and accessible via a secured port in the building slab.

Above-grade components of the SMD system (including the VMPs, riser pipes, blowers, and related accessories/monitoring devices) were installed during building construction and put into operation to allow occupancy of the building until an SVI evaluation can be

completed during the heating season. The SMD system is equipped with a visual alarm placed in a building maintenance office to notify of a potential system failure. After the building is complete and before building occupancy, initial system start-up testing (see Section 5.3.1) will be performed to verify that all components are installed and that the system is operating within design parameters. Professional Engineer-certified as-built drawings of the completed SMD system were submitted to NYSDEC.

The SMD system will be activated to allow for building occupancy prior to completion of an SVI evaluation, which must be performed during the heating season. An SVI evaluation work plan will be submitted to the NYSDEC and NYSDOH for review and approval prior to implementation of the SVI. The results and recommendations of the SVI evaluation will be summarized in a forthcoming report that will be submitted to NYSDEC for review. If the SVI evaluation results indicate the need for continued mitigation, the SMD system will remain in operation.

If the building is enclosed, the SMD system is capped, and the HVAC is operational during the heating season, Langan may conduct an SVI evaluation prior to building occupancy. If the results of the SVI evaluation indicate that mitigation is not required, then Langan will request approval to decommission the SMD from the NYSDEC and NYSDOH. A proposal to decommission SMD system operations may be submitted by the Volunteers (Coney Island Associates Phase 3 LLC, Coney Island Phase 3 Moderate LLC, and/or their successors) based on confirmatory data that justifies such request. The SMD system will remain in-place and operational until permission to decommission its use is granted in writing by the NYSDEC in consultation with the NYSDOH.

Procedures for operating and maintaining the SMD system are documented in the Operation, Maintenance and Monitoring (OM&M) Plan (see Section 5.0). As-built drawings and supporting documents, signed and sealed by a Professional Engineer (PE) who is licensed and registered in New York State, are included in Appendix G. The SMD system layout, including VMP locations, is shown on Figure 8.

3.3.2 Criteria for Completion of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the DD. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10.

As discussed below, the NYSDEC may approve termination of a groundwater monitoring program. When a remedial party receives this approval, the remedial party will

decommission all site-related monitoring, injection and recovery wells as per the NYSDEC CP-43 policy.

The remedial party will also conduct any needed site restoration activities, such as asphalt patching and decommissioning treatment system equipment. In addition, the remedial party will conduct any necessary restoration of vegetation coverage, trees and wetlands, and will comply with NYSDEC and United States Army Corps of Engineers regulations and guidance. Also, the remedial party will ensure that no ongoing erosion is occurring on the site.

3.3.3.1 – SMD System

An SMD system is being constructed as part of site development and will be activated to allow for building occupancy prior to completion of an SVI evaluation, which must be performed during the heating season. The SMD system will not be decommissioned unless prior written approval is granted by the NYSDEC and the NYSDOH. If SVI monitoring data indicate that the SMD system may no longer be required, a request to decommission the SMD system will be submitted by the remedial party to the NYSDEC and NYSDOH for consideration. SVI sampling data, obtained in compliance with the NYSDOH Soil Vapor Guidance, will be submitted to the NYSDEC and NYSDOH to document that the SMD system is no longer needed.

3.3.3.2 - Monitoring Wells Associated with In-Situ Groundwater Treatment and Source Removal

Groundwater monitoring activities to assess the efficacy of the groundwater treatment and source removal will continue quarterly for at least one year following installation of post-remediation groundwater monitoring wells, and as determined by the NYSDEC project manager, until residual groundwater concentrations are found to be consistently below the SGVs, or have become asymptotic at an acceptable level over an extended period. If monitoring data indicates that monitoring may no longer be required, a proposal to discontinue the remedy will be submitted by the remedial party. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC project manager. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional injections, source removal, treatment and/or control measures will be evaluated.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC project manager. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of site management for the site are included in the Quality Assurance Project Plan (QAPP) provided in Appendix H.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, sub-slab soil vapor, and indoor air);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards;
- Monitoring for potential SVI for any new building constructed at the site; and
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment.

To adequately address these issues, this Monitoring and Sampling Plan provides information on:

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells and the SMD system;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site-wide Inspection

Site-wide inspections will be performed a minimum of once per year. These periodic inspections must be conducted when the ground surface is visible (e.g., no snow cover). Site-wide inspections will be performed by a qualified environmental professional (QEP) as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State,

or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the frequency or duration of the inspections will require approval from the NYSDEC project manager. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed (provided in Appendix I – Site Management Forms). Inspections will be conducted in accordance with the health and safety plan (HASP), provided as Appendix J. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection;
- Documentation (e.g., HASP, CAMP, SMP) is available on-site; and
- Confirmation that site records are up to date.

All mitigation components installed at the site will be inspected. A comprehensive site-wide inspection will be conducted and documented according to this SMP schedule, regardless of the frequency of the Periodic Review Report (PRR). The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the EE;
- Achievement of remedial performance criteria; and
- Whether site records are complete and up to date.

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of the ECs, verbal notice to the NYSDEC project manager must be given by noon of the following business day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the site by a QEP, as defined in 6 NYCCR Part 375. Written confirmation must be provided to the NYSDEC project manager within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the

environment and the public. The remedial party will submit follow-up status reports to the NYSDEC within 45 days of the event on actions taken to respond to any emergency event requiring ongoing responsive action, describing and documenting actions taken to restore the effectiveness of the ECs.

4.3 Engineering Control, Inspection, Monitoring and Sampling

Monitoring programs for the SMD system and groundwater sampling, and an SVI evaluation are summarized in the following table and described in detail in Sections 4.3.1 through 4.3.3.

Table 4.3 – Monitoring/Inspection Schedule

Frequency*		Analysis
SVI Evaluation	During the first heating season following building enclosure, capping of the SMD system, and HVAC operation	Sub-slab soil vapor and co-located indoor air sampling at VMPs
SMD System Start-Up	Prior to building occupancy	Visual inspection and smoke testing for potential leaks in floor and above ground piping; flow rate, and vacuum at riser pipes and VMPs
SMD System Inspection	Annually and after required and/or unexpected shutdowns	Visual inspection of the above-ground system components and monitoring of system performance (e.g., flow rate and vacuum) at riser pipes and VMPs
Site-wide Inspection	Annually	Visual inspection of general site conditions and ECs
Groundwater Monitoring	Quarterly	Visual inspection of individual wellheads and groundwater sampling at each monitoring well

*Note: The frequency of events will be conducted as specified until otherwise approved by NYSDEC and NYSDOH.

Detailed sample collection and analytical procedures and protocols are provided in Appendix H – QAPP and Appendix K – Field Sampling Plan.

4.3.1 SVI Evaluation

An SVI evaluation will be performed during the first heating season following building enclosure and HVAC operation to determine whether continued active mitigation is required via the SMD system. The SVI evaluation will include collection of paired indoor air and sub-slab soil vapor samples from the eight VMPs. An SVI evaluation work plan will be submitted to the NYSDEC and NYSDOH for review and approval prior to implementation. The results and recommendations of the SVI evaluation will be summarized in a forthcoming SVI evaluation report that will be submitted to NYSDEC and NYSDOH for review and approval. Sampling locations, analytical parameters, and frequencies are provided in Table 4.3.1 – SVI Evaluation Sampling and Schedule.

Table 4.3.1 – SVI Evaluation Sampling and Schedule

Sampling Location	Location ID	Analytical Parameters & Methods	Sampling Frequency
Vacuum Monitoring Points	VMP-01 through VMP-08 (Sub-slab Soil Vapor Samples) IA01, IA02, IA03, IA04, IA05, IA06, IA07, and IA08 (Indoor Air Samples) AA01 (Ambient Air Sample)	VOCs (USEPA TO-15)	During the first heating season following building enclosure and HVAC operation

Detailed sample collection and analytical procedures and protocols are provided in the QAPP (Appendix H), and Field Sampling Plan (Appendix K).

Sub-slab soil vapor samples will be collected directly from the VMPs and indoor air samples will be collected from the ground floor of the building into appropriately sized Summa canisters that have been certified clean by the laboratory. The Summa canisters will have a flow controller calibrated for a 24-hour sampling period. Detailed sample collection and analytical procedures and protocols are provided in the QAPP (Appendix H), and the Field Sampling Plan (Appendix K).

4.3.2 SMD System Monitoring

Monitoring of the SMD system will be performed on a routine basis as long as it remains active, as identified in Table 4.3.2 Remedial System Monitoring Requirements and

Schedule (see below). The monitoring of remedial systems must be conducted by a QEP as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager. A visual inspection of the complete system will be conducted during each monitoring event. Unscheduled inspections and/or sampling may take place when a suspected failure of the SMD system has been reported or an emergency occurs that is deemed likely to affect the operation of the system. SMD system components to be monitored include, but are not limited to, the components included in Table 4.3.2 below.

Table 4.3.2 – Active SMD System Monitoring Requirements and Schedule

SMD System Component	Monitoring Parameter	Operating Range	Monitoring Schedule
Vacuum Monitoring Points	Vacuum Pressure	-0.02 inches of water column (target)	Annual
Vacuum Gauges	Vacuum Pressure	-30 inches of water column (maximum)	Annual
Exhaust Points	Motor Operation and Air Flow Direction	N/A	Annual
Remote Alarm System	Functionality & Integrity	N/A	Monthly/Annual
Exposed Riser Piping	Functionality, Integrity, and Labeling	N/A	Annual
Vacuum Blowers	Functionality & Integrity	N/A	Monthly/Annual

Sampling of the SMD system effluent is not anticipated based on concentrations of VOCs identified in vapor samples collected as part of the RI performed by Langan and anticipated flow rates.

A complete list of components to be inspected is provided in the inspection checklist, provided in Appendix I – Site Management Forms. If any equipment readings are not within their specified operation range, any equipment is observed to be malfunctioning or the system is not performing within specifications, then maintenance and repair pursuant to the OM&M Plan is immediately required.

4.3.3 Post-Remediation Groundwater Monitoring

As discussed in Section 2.4.3, monitoring wells RMW01 through RMW10 were installed to continue to monitor the effectiveness of the groundwater treatment in the southern

part of the site. As determined by the NYSDEC, quarterly well gauging and monitoring will be performed until residual groundwater contaminants are found to be consistently below the SGVs, or have become asymptotic at an acceptable level over an extended period, as determined by the NYSDEC. Monitoring will continue until permission to discontinue is granted in writing by NYSDEC. If significant increases in contaminants of concern are identified, then additional injections, source removal, treatment and/or control measures will be evaluated. Monitoring well constructions logs are included in Appendix E. The monitoring well network is shown on Figure 8.

4.4 Post-Remediation Media Monitoring and Sampling

Groundwater samples, sub-slab soil vapor and indoor air samples, and VMP data will be collected to confirm implementation of groundwater treatment and the SMD system have attained the remedial action objectives. Sampling locations, analytical parameters, and sampling frequencies are provided below. Detailed sample collection and analytical procedures and protocols are provided in Appendix K – Field Sampling Plan and Appendix H – QAPP.

4.4.1 Groundwater Sampling

Groundwater monitoring will be performed quarterly for the first year following the following installation of post-remediation groundwater monitoring wells (at least four groundwater sampling events). Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager. Table 4.4.1 summarizes the wells' identification numbers, as well as the purpose, location, depths, diameter and screened intervals of the wells.

Table 4.4.1 – Monitoring Well Construction Details

Well ID	Well Diameter (inches)	Latitude	Longitude	Well Casing Elevation (feet)	Screen Interval (feet bgs)
RMW01	2	40.576082	-73.985590	4	5-15
RMW02	2	40.575991	-73.985029	1	5-15
RMW03	2	40.575874	-73.985334	4	7 -17
RMW04	2	40.575651	-73.985514	9	5-15
RMW05	2	40.575759	-73.984875	7	3-13
RMW06	2	40.575537	-73.985379	9	6-16
RMW07	2	40.575572	-73.985058	6	10-20
RMW08	2	40.575455	-73.985364	10	5-15
RMW09	2	40.575491	-73.985043	10	5-15
RMW10	2	40.575514	-73.984829	5	10-20

Monitoring well construction logs are included in Appendix E.

Groundwater samples will be collected and analyzed for petroleum-related Part 375 TCL VOCs by a NYSDOH ELAP-certified laboratory. Monitoring wells will be gauged with an oil/water interface probe and sampled under the direction of a PE or QEP. Depth to water readings will be recorded. Groundwater samples will be collected using low-flow sampling techniques for all groundwater monitoring wells. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Post-remediation groundwater monitoring wells will be surveyed once they are finished with flush-mounted well covers incorporated in the new concrete building slab. Following the survey including top-of-casing elevations, depth to groundwater measurements will be used to develop a post-remediation groundwater contour map.

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced if an event renders the wells unusable. Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC project manager will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent PRR. Well

decommissioning without replacement will be done only with the prior approval of the NYSDEC project manager. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind at the nearest available location, unless otherwise approved by the NYSDEC project manager.

The sampling frequency may only be modified with the approval of the NYSDEC project manager. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC project manager.

4.4.2 SMD System Vacuum Field Monitoring

A network of VMPs were installed to monitor depressurization beneath the foundation slab. Table 4.4.2 below summarizes the VMP identification number and location:

Table 4.4.2: VMP Construction Details

Well ID	Latitude			Longitude		
	Deg/Min/Sec			Deg/Min/Sec		
VMP-1	73	59	8.01	40	34	33.55
VMP-2	73	59	7.54	40	34	32.75
VMP-3	73	59	7.53	40	34	31.48
VMP-4	73	59	6.7	40	34	31.97
VMP-5	73	59	6.17	40	34	31.61
VMP-6	73	59	5.11	40	34	31.76
VMP-7	73	59	5.42	40	34	32.5
VMP-8	73	59	5.46	40	34	33.8

VMP locations are shown on Figure 6.

The NYSDEC will be notified prior to repair or decommissioning of any VMPs for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent PRR. VMP decommissioning without replacement will be done only with the prior written approval of the NYSDEC. VMPs that are decommissioned because they have been rendered unusable will be replaced in kind at the nearest available location, unless otherwise approved by the NYSDEC.

The inspection frequency, as discussed in Section 4.3.2, may only be modified with the approval of NYSDEC. This SMP will be modified to reflect changes in sampling plans approved by NYSDEC.

4.4.3 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling log as provided in Appendix I – Site Management Forms. Other observations (e.g., VMP and groundwater monitoring well integrity) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the site-specific Field Sampling Plan provided as Appendix K.

Deliverables for the groundwater monitoring and the SVI sampling programs are specified in Section 7.0 – Reporting Requirements.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

This OM&M Plan provides a brief description of the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the site. This OM&M Plan:

- Includes the procedures necessary to allow individuals unfamiliar with the site to operate and maintain the SMD system;
- Will be updated periodically to reflect changes in site conditions or the manner in which the SMD system is operated and maintained; and
- Includes procedures for SMD system start-up and testing.

Routine inspections and maintenance of the SMD system are the responsibility of the site owner and/or building management.

Further detail regarding the OM&M of the SMD system is provided in Appendix L – Operation and Maintenance Manual. A copy of this Operation and Maintenance Manual, along with the complete SMP, is to be maintained at the site. This OM&M Plan is not to be used as a stand-alone document, but as a component document of this SMP.

5.2 Remedial System Performance Criteria

The SMD system consists of four noncontiguous piping systems, each connected to a roof-top mounted blower. The following table includes the minimum flow rate, vacuum pressure, and blower type for each system:

Blower ID	Min. Flow Rate (cfm)	Minimum Vacuum Pressure (inches of water column)	Blower Manufacturer/Model
SF-1	37	12	Airtech 3BA1310-7AT26
SF-2	23	11	Airtech 3BA1300-7AT06
SF-3	27	11	Airtech 3BA1300-7AT06
SF-4	39	12	Airtech 3BA1310-7AT26

5.3 Operation and Maintenance of the SMD system

This section provides a description of the OM&M for the SMD system. The OM&M Plan has been prepared based on the USEPA document EPA/625/R-92/016 for the sub-slab depressurization of large buildings and schools, New York City Mechanical Code Section MC 512 (2022), and the NYSDOH Soil Vapor Guidance.

Details of the SMD system design and layout are provided in Section 3.3.1 and are included in the as-built drawings in Appendix G. Manufacturer cut-sheets and as-built drawings for the SMD are provided in Appendix A of the Operations and Maintenance Manual, which is provided as Appendix L of this SMP.

5.3.1 System Start-Up and Testing

Prior to initial SMD system start-up, all accessible SMD system components will be inspected. The equipment will be started in accordance with the manufacturer's recommendations. System testing for the initial start-up will be performed as follows:

1. While the system is operating, smoke tubes will be used to check for leaks through concrete cracks, floor joints, and at exposed above-grade piping connections associated with the lowest-level slab. Any leaks identified will be properly sealed.
2. The blower-malfunction warning device will be tested.
3. Airflow rates will be measured through the sample ports and differential pressure will be measured in the VMPs with a TSI VelociCalc meter to document that airflow within the system is consistent with design calculations.
4. Vacuum pressure will be measured at the VMPs to document pressure field extension and at the blower to document that vacuum conveyance is consistent with the design.
5. The building's HVAC system is operating under normal conditions.

An SVI will be performed no sooner than 30 days after system start-up, and during the heating season, to evaluate the system performance. If the system is started outside of the heating season, then the SVI evaluation will be performed during the next heating season.

The active system testing described above will be conducted during the initial SMD system start-up and if, in the course of the SMD system lifetime, the system shuts down or significant changes are made to the system and the system must be restarted.

If pressure field monitoring indicates that the sub-slab vacuum extents are not reaching the edges of the foundation slabs, supplemental measures for system optimization will be coordinated with the NYSDEC and NYSDOH, which may include upgrades to the SMD system or blower and/or modifications to the HVAC system.

5.3.2 Routine System Operation and Maintenance

The SMD system and its vacuum blowers will operate continuously after the initial start-up, in accordance with appropriate design specifications and parameters, the manufacturer's operation manual, and SMP requirements, until discontinuation has been approved in writing by the NYSDEC and NYSDOH.

Routine equipment maintenance is the responsibility of the remedial party and/or building management. The blower assembly and its appurtenances shall be inspected at the interval specified in the manufacturer's operation manual. Routine equipment maintenance may include, but is not limited to, replacing the blower motor or other parts, replacing vacuum pressure gauges, replacing/cleaning air filters, and testing the remote alarm system.

If any technical difficulties or non-optimal operating conditions are encountered with the SMD system, the site owner and/or building management shall complete any necessary modifications or repairs to the system to bring the system into compliance with appropriate design specifications and parameters. The remedial party, NYSDEC and NYSDOH shall be notified of any significant modifications or repairs that are planned.

5.3.3 Non-Routine Operation and Maintenance

Non-routine maintenance may also be required during operation, including the following situations:

- The building's owner, operator, or maintenance staff report that the alarm device indicates the SMD system is not operating properly;
- During monthly inspections, the building's owner, operator, or maintenance staff report any observable deficiencies with the SMD system;
- The SMD system becomes damaged;
- The building has undergone renovations that may reduce the effectiveness of the SMD system; or
- There are changes to the building use or occupancy.

The NYSDEC will be informed within 24 hours upon discovery of SMD system failure. Repairs or adjustments will be made to the system as appropriate and as per manufacturer guidelines, within 15 days of the equipment failure, or whenever possible (i.e., pending availability of parts). If necessary, the SMD system will be redesigned and restarted. Activities conducted during non-routine maintenance visits will vary.

NYSDEC and NYSDOH will be notified of any changes to the system. If required, additional sampling and/or evaluation will be completed based on these modifications.

5.3.4 System Performance Monitoring

Performance monitoring will be conducted by the Remedial Engineer (RE) or an individual under the supervision of the RE to document the effectiveness of the SMD system at the following milestones/intervals:

- At the commissioning event and start-up inspection
- Annually, concurrent with the annual site inspections
- After any severe weather or other emergency conditions (natural disasters and/or fires) that has or may have damaged the system, if necessary
- After any significant repairs and/or modifications

Performance monitoring will include the similar procedures listed for the commissioning and start-up inspection as stated in Section 5.3.1.

5.3.5 System Monitoring Devices and Alarms

The SMD system will be equipped with a warning device (i.e., alarm) located in the building maintenance office to indicate that the system is not operating properly. The SMD system will also have a telemetry system with remote capabilities to alert building management and other responsible parties as needed in case of disruption. The alarm will be labeled as part of the vapor mitigation system and will direct staff to notify the appropriate parties listed in this SMP. If the warning device is activated, applicable maintenance and repairs will be conducted in accordance with the OM&M Plan (Appendix L) and with adequate lock out/tag out procedures, as required, and the SMD system will be restarted. Operational problems will be noted in the PRR to be prepared for that reporting period.

5.3.6 Fire Safety

The owner or remedial party will conduct an annual facility walk with the local fire chief and/or fire suppression team. The site walk will allow for the addition of the facility to any local preplanning efforts. The NYSDEC project manager will be provided with the local fire chief's/fire suppression team's recommendations as soon as they become available. Following review, the NYSDEC project manager may direct the owner or remedial party to implement the recommendations and/or revise this SMP.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a current vulnerability assessment that evaluates the vulnerability of the site and/or engineering controls to severe storms/weather events and associated flooding. This section also identifies vulnerability assessment updates that will be conducted for the site in PRRs.

According to the Federal Emergency Management Agency (FEMA) Flood Map Service Center (Map Number 3604970353F, dated September 05, 2007), the site is located in Zone AE, which is designated for areas subject to inundation by the 1% annual chance flood event, therefore the potential for floods at the site is moderate to low.

Site erosion is not expected during severe weather or precipitation events because soil will be covered with the building's footprint, vegetation, and/or concrete/asphalt. The building's footprint protects the SMD system from extreme wind conditions and storm water drainage overflow. ECs will be inspected after severe weather or other emergency conditions (natural disasters or fires) that are known to have inflicted damage at the site or adjoining properties and repaired, as necessary.

The SMD system receives electrical utility service from Consolidated Edison, Inc. (ConEd). A power loss and/or dips/surges in voltage during a severe weather event, including lightning strikes, may impact the SMD equipment and operations. The SMD system control panel will shut down the system in the event of a dip or surge in voltage.

Overall, the SMD system is not expected to be vulnerable to the effects of global climate change, including severe weather and flooding events.

An Environmental Footprint Summary and a Climate Screening Checklist were completed for the site as part of this SMP and are included as Appendix M and N, respectively. The climate screening indicated that no further action is necessary.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section provides an environmental footprint analysis of the remedy, as implemented at the time of this SMP. This section of this SMP also provides a summary of green remediation evaluations to be completed for the site during site management and reported in PRRs.

6.2.1 Environmental Footprint Analysis

An environmental footprint analysis was completed using SiteWise™ (available in the Sustainable Remediation Forum [SURF] library) which is a NYSDEC-accepted environmental footprint analysis calculator. The following components of this SMP were entered in the SiteWise™ model:

- Annual Inspections
- Groundwater Monitoring
- SMD System Operation
- SVI Evaluation

The annual inspection analysis includes estimating the mileage to and from the site for the annual inspections, and the SVI evaluation includes sub-slab soil vapor and indoor air sampling (as discussed in Section 4.3.1). The groundwater monitoring analysis estimates the mileage to and from the site for sampling events, equipment pick-ups and drop-offs, drum disposal, laboratory courier services, laboratory fees, and residual waste (landfill and groundwater) for four quarterly sampling events. The groundwater monitoring analysis also includes an estimate for energy usage and emissions based on the cost of the overall laboratory analysis required for groundwater sampling at the site. The SMD system operation includes estimation for mileage to and from the site for system inspections and operation of four roof-top mounted blowers for 24 hours per day for 1 year.

Using the above identified information, the SiteWise™ model estimated the following emissions and total energy usage:

Emissions and Energy Usage	Quantity (based on assumptions)
Greenhouse Gas (GHG) Emissions (metric ton)	120
Total Energy Used (million British thermal unit [MMBTU])	2,400
Water Consumption (gallons)	130,000
Electricity Usage (MWH)	260
Total Nitrogen Oxide (NOx) Emissions (metric ton)	0.24
Total Sulphur Oxide (SOx) Emissions (metric ton)	0.23
Total Particulate Matter (less than 10 micrometers in diameter [PM10]) Emissions (metric ton)	0.073

The outputs of the SiteWise™ model are provided in Appendix M.

6.2.2 Green Remediation Principles and Best Management Practices

Green remediation principles and techniques will be implemented to the extent feasible in the site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term
- Reducing direct and indirect GHGs and other emissions
- Increasing energy efficiency and minimizing use of non-renewable energy
- Conserving and efficiently managing resources and materials
- Reducing waste, increasing recycling and increasing reuse of materials that would otherwise be considered a waste
- Maximizing habitat value and creating habitat when possible

- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development
- Additionally, in accordance with NYSDEC standard protocol, future on-site buildings will include, at a minimum, a 20-mil vapor barrier/waterproofing membrane on the foundation, which may improve energy efficiency as an element of construction.

The green remediation components that will be evaluated during site management include but are not limited to:

- Waste Generation
- Energy Use
- Emissions
- Water Usage
- Land and/or Ecosystem

This SMP will include the implementation of several Best Management Practices (BMP) related to these green remediation components. The BMPs are outlined below.

6.2.2.1 Waste Generation

Waste generation considers the management of waste associated with SMP activities and any waste reduction projects including, but not limited to, material reuse and recycling.

During each groundwater monitoring event, minimal waste (less than four 5-gallon plastic buckets, less than one box of disposable gloves, and less than 25 gallons of purged groundwater and decontamination water) will be generated, and electronic means of data collection (e.g., tablets) will be used to reduce paper consumption. This reduces the waste generated over the life span of the quarterly sampling events. Waste generation is not anticipated for routine annual site-wide inspections.

Several waste streams may be generated during implementation of non-routine SMP activities (e.g., soil, polyethylene sheets used for stockpile coverage and separating types of contamination, nitrile gloves for sampling, disposable sample ware, acetate liners from drilling operations, decontamination materials). When possible, an effort will be made to minimize consumption/generation of such materials. If possible, decontamination and

reuse of applicable materials will be considered. Electronic methods of data collection (e.g., tablets) will also be used to reduce paper consumption when possible.

6.2.2.2 Electrical Energy Use

Energy usage considers the electricity usage needed for SMP activities. Energy usage is not anticipated for routine SMP activities (annual site-wide inspections) but is required for operation of the SMD system.

6.2.2.3 Emissions

Emissions tracking considers fuel usage for transportation of personnel to and from the site for site management events.

During routine site management visits, fuel usage is required for transportation of personnel to and from the site, transportation associated with screening/sampling equipment, transportation of bottle ware and samples to and from the lab, and drum pick-ups. Site visits will be minimized to reduce emissions by consolidating site activities (e.g., conducting the annual inspection during site visits for quarterly groundwater sampling events). When possible and pending staff availability, personnel will be considered based on their proximity to the site and will be encouraged to take public transport.

To reduce fuel usage, trucks and heavy machinery operators will be encouraged to minimize idling time and shut down vehicles or equipment when not in use. The contractor will also be encouraged to perform routine, on-time maintenance such as oil changes to improve fuel efficiency. Ultra-low sulfur diesel (ULSD) fuel and the best available technology (BAT) for reducing emissions will be used for construction vehicles in accordance with NYC Local Law 77. When possible and pending staff availability, personnel will be considered based on their proximity to the site and will be encouraged to take public transport.

6.2.2.4 Water Usage

Water usage considers sources of water for tasks such as decontamination, irrigation, etc. Water usage is not anticipated for annual site-wide inspections, and less than 5 gallons of water will be used for decontamination during each quarterly groundwater monitoring event. Water will only be consumed when necessary, and consumption will be in accordance with local regulations.

6.2.2.5 Land and/or Ecosystems

Land and/or ecosystems consider any disturbances and restoration of land and/or ecosystems as part of the implementation/operation of the remedy.

6.2.3 Timing of Green Remediation Evaluations

Green remediation evaluations and corresponding modifications will be undertaken as part of a formal Remedial System Optimization (RSO), or at any time that the NYSDEC project manager feels appropriate (e.g., during significant maintenance events or in conjunction with storm recovery activities).

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities. Reporting of these modifications will be presented in the PRR.

6.2.4 SMD System

The SMD system will be properly operated considering the current site conditions to conserve materials and resources to the greatest extent possible. Consideration will be given to operating rates and use of consumables. Spent materials will be sent for recycling, as appropriate.

6.2.5 Building Operations

Structures including buildings and sheds will be operated and maintained to provide for the most efficient operation of the remedy, while minimizing energy, waste generation and water consumption.

6.2.6 Frequency of System Checks, Sampling and Other Periodic Activities

Transportation to and from the site, use of consumables in relation to visiting the Site in order to conduct system checks and/or collect samples, and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been coordinated so that these tasks can be accomplished in a manner that does not impact remedy protectiveness while reducing further expenditure of energy or resources.

All efforts will be made to minimize the number of trips to and from site and the amount of waste generated during the groundwater monitoring events. Mass transit will be used when possible for completing the annual inspections, and the laboratory courier will pick up samples from the site as part of a longer courier route including other sites requiring services in the area.

6.2.7 Metrics and Reporting

As discussed in Section 7.0 and as shown in Appendix I – Site Management Forms, information on energy usage, solid waste generation, transportation and shipping, water usage and land use and ecosystems will be recorded to facilitate and document consistent implementation of green remediation during site management and to identify

corresponding benefits. A set of metrics has been developed and will be evaluated over time to ensure that green remediation actions are achieving the desired results.

Energy usage associated with SMD system operation, metrics associated with the management and disposal of waste streams related to the ECs, and travel associated with deliveries and shipments for ongoing monitoring and maintenance of the remedial system (i.e., groundwater sampling equipment and laboratory analysis of samples) will be evaluated and reported annually in the PRR using the site inspection form.

6.3 Remedial System Optimization

An RSO study will be conducted any time that the NYSDEC project manager or the remedial party communicates in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions and/or mitigation measures have not met or are not expected to meet RAOs in the time frame estimated in the DD;
- The management and operation of the remedial system (e.g., SMD system) is exceeding the estimated costs;
- The remedial system is not performing as expected or as designed;
- Previously unidentified source material may be suspected;
- Plume shift has potentially occurred;
- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the site's cleanup goals, gather additional performance or media-specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

The RSO study will focus on overall site cleanup strategy, process optimization and management with the intent of identifying impediments to cleanup and improvements to site operations to increase efficiency, cost effectiveness and remedial time frames. Green remediation technology and principals are to be considered when performing the RSO.

7.0. REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in Appendix I. These forms are subject to NYSDEC revision. All site management inspection, maintenance, and monitoring events will be conducted by a QEP as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 7.1 and summarized in the PRR.

Table 7.1: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Site-wide Inspections	Annually
SMD System Inspections and Associated Soil Vapor/Indoor Air Sampling (If Applicable)	Annually
Groundwater Sampling Event Results	Quarterly for at least one year following installation of post-remediation groundwater monitoring wells. If warranted by results, a request to decrease frequency or discontinue monitoring will be submitted to the NYSDEC
PRR	First due 16 months after COC, then annually

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC project manager.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;

- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (e.g., groundwater, sub-slab vapor, indoor air, outdoor air);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;

- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. As of the effective date of this SMP, data is to be supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link http://www.dec.ny.gov/chemical/62440.html.

7.2 Periodic Review Report

A PRR will be submitted to the NYSDEC project manager beginning sixteen (16) months after the COC is issued. After submittal of the initial PRR, the next PRR shall be submitted annually to the NYSDEC project manager or at another frequency as may be required by the NYSDEC project manager. The site is subdivided into separate parcels with different ownership, a single PRR will be prepared that addresses the site described in Appendix A - Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the PRR. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the site
- Results of the required annual site inspections, fire inspections and severe condition inspections, if applicable
- Description of any change of use, import of materials, or excavation that occurred during the certifying period
- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted during the certification period
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions

- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted - these tables and figures will include a presentation of past data as part of an evaluation of contaminant concentration trends, including but not limited to:
  - Trend monitoring graphs that present groundwater contaminant levels from before the start of the remedy implementation to the most current sampling data;
  - Trend monitoring graphs depicting system influent analytical data on a per event and cumulative basis;
  - OM&M data summary tables; and
  - A current plume map for sites with remaining groundwater contamination.
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. As of the effective date of this SMP, data are supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.
- A site evaluation, which includes the following:
  - The compliance of the remedy with the requirements of the site-specific DD;
  - The operation and the effectiveness of all treatment systems, including identification of any needed repairs or modifications;
  - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;
  - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan;
  - An update to the climate change vulnerability assessment if site or external conditions have changed since the previous assessment, and recommendations to address vulnerabilities;

  - A summary of the Green Remediation evaluation, including a quantitative and qualitative overview of a site's environmental impacts and recommendations to improve the remedy's environmental footprint. The PRR will include the completed Summary of Green Remediation Metrics form provided in Appendix N;
  - An evaluation of trends in contaminant levels in the affected media to determine if the remedy continues to be effective in achieving remedial goals as specified by the DD; and
  - The overall performance and effectiveness of the remedy.

- A performance summary for the SMD system during the calendar year, including information such as:
  - The number of days the system operated for the reporting period;
  - A description of breakdowns and/or repairs along with an explanation for any significant downtime;
  - A description of the resolution of performance problems;
  - Alarm conditions;
  - Trends in equipment failure;
  - A summary of the performance and/or effectiveness monitoring; and
  - Comments, conclusions, and recommendations based on data evaluation. Recommendations must address how receptors would be impacted. Recommendations can include:
    - Proposals to address efficiency and costs such as: instituting remote operation, system changes to decrease maintenance costs and downtime, and system changes to decrease energy use; and
    - Proposals to modify or shut down a treatment system due to remediation completion, system performance or changed conditions. System shutdowns are addressed in Section 6.4 of DER-10.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a PE licensed to practice and registered in New York State will prepare, and include in the PRR, the following certification as per the requirements of NYSDEC DER-10:

"*For each institutional or engineering control identified for the site, I certify that all of the following statements are true:*

- *The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the site is compliant with the environmental easement;*
- *The engineering control systems are performing as designed and are effective;*
- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and*
- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Jason J. Hayes, of Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C., am certifying as the Remedial Party's Designated Site Representative: I have been authorized and designated by all site owners/remedial parties to sign this certification for the site.

I certify that the New York State Education Department has granted a Certificate of Authorization to provide Professional Engineering services to the firm that prepared this Periodic Review Report.

Every five years the following certification will be added, unless otherwise approved by NYSDEC:

Based on the on-site data available to Langan and site observations, the assumptions made in the qualitative exposure assessment remain valid.

The signed certification will be included in the PRR.

The PRR will be submitted in electronic format to the NYSDEC and NYSDOH project managers. The PRR may also need to be submitted in hard-copy format if requested by the NYSDEC project manager.

7.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control or failure to conduct site management activities, a Corrective Measures Work Plan will be submitted to the NYSDEC project manager for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC project manager.

7.4 Remedial System Optimization Report

If an RSO is to be performed (see Section 6.3), upon completion of an RSO, an RSO report must be submitted to the NYSDEC project manager for approval. A general outline for the RSO report is provided in Appendix O. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to this SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC and NYSDOH project managers.

8.0 REFERENCES

1. 6 NYCRR Part 703.5 – Water Quality Standards (January 31, 2017).
2. Limited Subsurface Investigation Report, prepared by Langan, dated March 1, 2023
3. NYSDEC – Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 (June 1998, April 2000 addendum).
4. NYSDEC DER-10 – Technical Guidance for Site Investigation and Remediation (May 2010).
5. NYSDEC DER-31 – Green Remediation (August 2010).
6. NYSDOH – Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006, updated February 2024).
7. Phase I Environmental Site Assessment for Block 7061, Lots 14, 20, & 27, prepared by Hillmann Consulting (Hillmann), dated June 11, 2018
8. Phase I Environmental Site Assessment, prepared by Langan, dated January 26, 2025
9. Phase II Environmental Site Investigation Letter, prepared by Fleming Lee Shue, dated March 30, 2009
10. Phase II Environmental Site Investigation Report for Block 7061, Lots 14, 20, & 27, prepared by Hillmann, dated June 13, 2018
11. Remedial Action Work Plan, prepared by Langan, dated November 20, 2024
12. Remedial Investigation Report, prepared by Langan, dated August 14, 2024
13. In-situ Groundwater Treatment Remedial Design Plan, prepared by Langan, dated March 27, 2025

TABLES

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB19	SB19	SB19	SB20	SB20	SB20	SB21	SB21	SB21	SB22	SB22	SB22	SB23	SB24
					Sample Name	SB19_0-2	SB19_2-4	SB19_6-8	SB20_0-2	SB20_2-4	SB20_5-7	SB21_0-2	SB21_2-4	SB21_6-8	SB22_0-2	SB22_4-6	SB22_7-9	SB23_0-2	SB24_0-2
					Sample Date	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/30/2023	05/30/2023
					Sample Depth	0-2	2-4	6-8	0-2	2-4	5-7	0-2	2-4	6-8	0-2	4-6	7-9	0-2	0-2
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																			
1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	NS	mg/kg	<0.00047 U	<0.00052 U	<0.00062 U	<0.00052 U	<0.00048 U	<0.00054 U	<0.0006 U	<0.00054 U	<0.00057 U	<0.0011 U	<0.00063 U	<0.00059 U	<0.00059 U	<0.0005 U
1,1,1-Trichloroethane	71-55-6	0.68	0.68	100	mg/kg	<0.00047 U	<0.00052 U	<0.00062 U	<0.00052 U	<0.00048 U	<0.00054 U	<0.0006 U	<0.00054 U	<0.00057 U	<0.0011 U	<0.00063 U	<0.00059 U	<0.00059 U	<0.0005 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	mg/kg	<0.00047 U	<0.00052 U	<0.00062 U	<0.00052 U	<0.00048 U	<0.00054 U	<0.0006 U	<0.00054 U	<0.00057 U	<0.0011 U	<0.00063 U	<0.00059 U	<0.00059 U	<0.0005 U
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
1,1-Dichloroethane	75-34-3	0.27	0.27	26	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
1,1-Dichloroethene	75-35-4	0.33	0.33	100	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
1,1-Dichloropropene	563-58-6	NS	NS	NS	mg/kg	<0.00047 U	<0.00052 U	<0.00062 U	<0.00052 U	<0.00048 U	<0.00054 U	<0.0006 U	<0.00054 U	<0.00057 U	<0.0011 U	<0.00063 U	<0.00059 U	<0.00059 U	<0.0005 U
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
1,2,3-Trichloropropane	96-18-4	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
1,2,4,5-Tetramethylbenzene	95-93-2	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	0.00026 J	<0.002 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
1,2,4-Trimethylbenzene	95-63-6	**3.6**	3.6	52	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	0.00047 J	<0.002 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	NS	NS	mg/kg	<0.0028 U	<0.0031 U	<0.0037 U	<0.0031 U	<0.0029 U	<0.0033 U	<0.0036 U	<0.0032 U	<0.0034 U	<0.0065 U	<0.0038 U	<0.0036 U	<0.0035 U	<0.003 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	NS	NS	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
1,2-Dichloroethane	107-06-2	0.02	0.02	3.1	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
1,2-Dichloropropane	78-87-5	NS	NS	NS	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	**8.4**	8.4	52	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	0.00029 J	<0.002 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
1,3-Dichloropropane	142-28-9	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
1,4-Diethyl Benzene	105-05-5	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<0.075 U	<0.084 U	<0.099 U	<0.084 U	<0.078 U	<0.087 U	<0.096 U	<0.087 U	<0.091 U	<0.17 U	<0.1 U	<0.095 U	<0.094 U	<0.08 U
2,2-Dichloropropane	594-20-7	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
2-Chlorotoluene	95-49-8	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
2-Hexanone (MBK)	591-78-6	NS	NS	NS	mg/kg	<0.0094 U	<0.01 U	<0.012 U	<0.01 U	<0.0097 U	<0.011 U	<0.012 U	<0.011 U	<0.011 U	<0.022 U	<0.012 U	<0.012 U	<0.012 UJ	<0.01 UJ
4-Chlorotoluene	106-43-4	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
4-Ethyltoluene	622-96-8	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
Acetone	67-64-1	**0.05**	0.05	100	mg/kg	<0.0094 U	<0.01 U	0.0059 J	0.0085 J	0.024	<0.011 U	0.011 J	<0.011 U	0.006 J	<0.022 U	<0.012 U	0.0097 J	0.0098 J	0.011
Acrylonitrile	107-13-1	NS	NS	NS	mg/kg	<0.0038 U	<0.0042 U	<0.0049 U	<0.0042 U	<0.0039 U	<0.0043 U	<0.0048 U	<0.0043 U	<0.0045 U	<0.0086 U	<0.005 U	<0.0047 U	<0.0047 U	<0.004 U
Benzene	71-43-2	**0.06**	0.06	4.8	mg/kg	<0.00047 U	<0.00052 U	<0.00062 U	<0.00052 U	<0.00048 U	<0.00054 U	<0.0006 U	<0.00054 U	<0.00057 U	<0.0011 U	<0.00063 U	<0.00059 U	<0.00059 U	<0.0005 U
Bromobenzene	108-86-1	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
Bromochloromethane	74-97-5	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
Bromodichloromethane	75-27-4	NS	NS	NS	mg/kg	<0.00047 U	<0.00052 U	<0.00062 U	<0.00052 U	<0.00048 U	<0.00054 U	<0.0006 U	<0.00054 U	<0.00057 U	<0.0011 U	<0.00063 U	<0.00059 U	<0.00059 U	<0.0005 U
Bromoform	75-25-2	NS	NS	NS	mg/kg	<0.0038 U	<0.0042 U	<0.0049 U	<0.0042 U	<0.0039 U	<0.0043 U	<0.0048 U	<0.0043 U	<0.0045 U	<0.0086 U	<0.005 U	<0.0047 U	<0.0047 U	<0.004 U
Bromomethane	74-83-9	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
Carbon Disulfide	75-15-0	NS	NS	NS	mg/kg	<0.0094 U	<0.01 U	0.014	<0.01 U	<0.0097 U	<0.011 U	<0.012 U	<0.011 U	<0.011 U	<0.022 U	<0.012 U	0.0097 J	<0.012 U	<0.01 U
Carbon Tetrachloride	56-23-5	0.76	0.76	2.4	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
Chlorobenzene	108-90-7	1.1	1.1	100	mg/kg	<0.00047 U	<0.00052 U	<0.00062 U	<0.00052 U	<0.00048 U	<0.00054 U	<0.0006 U	<0.00054 U	<0.00057 U	<0.0011 U	<0.00063 U	<0.00059 U	<0.00059 U	<0.0005 U
Chloroethane	75-00-3	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
Chloroform	67-66-3	0.37	0.37	49	mg/kg	<0.0014 U	<0.0016 U	<0.0018 U	<0.0016 U	<0.0014 U	<0.0016 U	<0.0018 U	<0.0016 U	<0.0017 U	<0.0032 U	<0.0019 U	<0.0018 U	<0.0018 U	<0.0015 U
Chloromethane	74-87-3	NS	NS	NS	mg/kg	<0.0038 U	<0.0042 U	<0.0049 U	<0.0042 U	<0.0039 U	<0.0043 U	<0.0048 U	<0.0043 U	<0.0045 U	<0.0086 U	<0.005 U	<0.0047 U	<0.0047 U	<0.004 U
Cis-1,2-Dichloroethene	156-59-2	0.25	0.25	100	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	mg/kg	<0.00047 U	<0.00052 U	<0.00062 U	<0.00052 U	<0.00048 U	<0.00054 U	<0.0006 U	<0.00054 U	<0.00057 U	<0.0011 U	<0.00063 U	<0.00059 U	<0.00059 U	<0.0005 U
Cymene	99-87-6	NS	NS	NS	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	0.0012	0.011	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	0.00014 J	<0.0012 U	<0.0012 U	<0.001 U
Dibromochloromethane	124-48-1	NS	NS	NS	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
Dibromomethane	74-95-3	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
Dichlorodifluoromethane	75-71-8	NS	NS	NS	mg/kg	<0.0094 U	<0.01 U	<0.012 U	<0.01 U	<0.0097 U	<0.011 U	<0.012 U	<0.011 U	<0.011 U	<0.022 U	<0.012 U	<0.012 U	<0.012 U	<0.01 U
Diethyl Ether (Ethyl Ether)	60-29-7	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
Ethylbenzene	100-41-4	**1**	1	41	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	0.00095 J	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.0038 U	<0.0042 U	<0.0049 U	<0.0042 U	<0.0039 U	<0.0043 U	<0.0048 U	<0.0043 U	<0.0045 U	<0.0086 U	<0.005 U	<0.0047 U	<0.0047 U	<0.004 U
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
M,P-Xylene	179601-23-1	NS	NS	NS	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	0.12	100	mg/kg	<0.0094 U	<0.01 U	<0.012 U	<0.01 U	<0.0097 U	<0.011 U	<0.012 U	<0.011 U	<0.011 U	<0.022 U	<0.012 U	<0.012 U	<0.012 U	<0.01 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	NS	NS	mg/kg	<0.0094 U	<0.01 U	<0.012 U	<0.01 U	<0.0097 U	<0.011 U	<0.012 U	<0.011 U	<0.011 U	<0.022 U	<0.012 U	<0.012 U	<0.012 U	<0.01 U
Methylene Chloride	75-09-2	0.05	0.05	100	mg/kg	<0.0047 U	<0.0052 U	<0.0062 U	<0.0052 U	<0.0048 U	<0.0054 U	<0.006 U	<0.0054 U	<0.0057 U	<0.011 U	<0.0063 U	<0.0059 U	<0.0059 U	<0.005 U
Naphthalene	91-20-3	**12**	12	100	mg/kg	<0.0038 U	<0.0042 U	<0.0049 U	<0.0042 U	<0.0039 U	<0.0043 U	<0.0048 U	<0.0043 U	<0.0045 U	<0.0086 U	<0.005 U	<0.0047 U	<0.0047 U	<0.004 U
n-Butylbenzene	104-51-8	**12**	12	100	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
n-Propylbenzene	103-65-1	**3.9**	3.9	100	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	NS	NS	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
Sec-Butylbenzene	135-98-8	11	11	100	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
Styrene	100-42-5	NS	NS	NS	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	0.00049 J	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
T-Butylbenzene	98-06-6	5.9	5.9	100	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
Tert-Butyl Methyl Ether	1634-04-4	0.93	0.93	100	mg/kg	<0.0019 U	<0.0021 U	<0.0025 U	<0.0021 U	<0.0019 U	<0.0022 U	<0.0024 U	<0.0022 U	<0.0023 U	<0.0043 U	<0.0025 U	<0.0024 U	<0.0024 U	<0.002 U
Tetrachloroethene (PCE)	127-18-4	**1.3**	1.3	19	mg/kg	<0.00047 U	<0.00052 U	<0.00062 U	<0.00052 U	<0.00048 U	<0.00054 U	<0.0006 U	<0.00054 U	<0.00057 U	<0.0011 U	<0.00063 U	<0.00059 U	0.0007	0.001
Toluene	108-88-3	**0.7**	0.7	100	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	NS	NS	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
Total Xylenes	1330-20-7	**0.26**	1.6	100	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	NS	NS	NS	mg/kg	<0.00047 U	<0.00052 U	<0.00062 U	<0.00052 U	<0.00048 U	<0.00054 U	<0.0006 U	<0.00054 U	<0.00057 U	<0.0011 U	<0.00063 U	<0.00059 U	<0.00059 U	<0.0005 U
Trans-1,2-Dichloroethene	156-60-5	0.19	0.19	100	mg/kg	<0.0014 U	<0.0016 U	<0.0018 U	<0.0016 U	<0.0014 U	<0.0016 U	<0.0018 U	<0.0016 U	<0.0017 U	<0.0032 U	<0.0019 U	<0.0018 U	<0.0018 U	<0.0015 U
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	NS	NS	mg/kg	<0.0047 U	<0.0052 U	<0.0062 U	<0.0052 U	<0.0048 U	<0.0054 U	<0.006 U	<0.0054 U	<0.0057 U	<0.011 U	<0.0063 U	<0.0059 U	<0.0059 U	<0.005 U
Trichloroethene (TCE)	79-01-6	0.47	0.47	21	mg/kg	<0.00047 U	<0.00052 U	<0.00062 U	<0.00052 U	<0.00048 U	<0.00054 U	<0.0006 U	<0.00054 U	<0.00057 U	<0.0011 U	<0.00063 U	<0.00059 U	<0.00059 U	<0.0005 U
Trichlorofluoromethane	75-69-4	NS	NS	NS	mg/kg	<0.0038 U	<0.0042 U	<0.0049 U	<0.0042 U	<0.0039 U	<0.0043 U	<0.0048 U	<0.0043 U	<0.0045 U	<0.0086 U	<0.005 U	<0.0047 U	<0.0047 U	<0.004 U
Vinyl Acetate	108-05-4	NS	NS	NS	mg/kg	<0.0094 U	<0.01 U	<0.012 U	<0.01 U	<0.0097 U	<0.011 U	<0.012 U	<0.011 U	<0.011 U	<0.022 U	<0.012 U	<0.012 U	<0.012 U	<0.01 U
Vinyl Chloride	75-01-4	0.02	0.02	0.9	mg/kg	<0.00094 U	<0.001 U	<0.0012 U	<0.001 U	<0.00097 U	<0.0011 U	<0.0012 U	<0.0011 U	<0.0011 U	<0.0022 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.001 U
Total VOCs	TOTAL VOCS	NS	NS	NS	mg/kg	ND	ND	0.0199	0.0097	0.03644	ND	0.011	ND	0.006	ND	0.00014	0.0194	0.01152	0.012

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB19	SB19	SB19	SB20	SB20	SB20	SB21	SB21	SB21	SB22	SB22	SB22	SB23	SB24
					Sample Name	SB19_0-2	SB19_2-4	SB19_6-8	SB20_0-2	SB20_2-4	SB20_5-7	SB21_0-2	SB21_2-4	SB21_6-8	SB22_0-2	SB22_4-6	SB22_7-9	SB23_0-2	SB24_0-2
					Sample Date	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/30/2023	05/30/2023
					Sample Depth	0-2	2-4	6-8	0-2	2-4	5-7	0-2	2-4	6-8	0-2	4-6	7-9	0-2	0-2
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																			
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<0.027 U	<0.026 U	<0.03 U	<0.026 U	<0.027 U	<0.028 U	<0.026 U	<0.026 U	<0.028 U	<0.025 U	<0.029 U	<0.029 U	<0.13 U	<0.13 U
2,4,5-Trichlorophenol	95-95-4	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 UJ	<0.88 UJ
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	mg/kg	<0.11 U	<0.1 U	<0.12 U	<0.1 U	<0.11 U	<0.11 U	<0.1 U	<0.1 U	<0.11 U	<0.1 U	<0.12 U	<0.12 U	<0.52 UJ	<0.52 UJ
2,4-Dichlorophenol	120-83-2	NS	NS	NS	mg/kg	<0.16 U	<0.15 U	<0.18 U	<0.16 U	<0.16 U	<0.17 U	<0.15 U	<0.15 U	<0.17 U	<0.15 U	<0.18 U	<0.18 U	<0.78 UJ	<0.79 UJ
2,4-Dimethylphenol	105-67-9	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 UJ	<0.88 UJ
2,4-Dinitrophenol	51-28-5	NS	NS	NS	mg/kg	<0.86 U	<0.82 U	<0.96 U	<0.84 U	<0.86 U	<0.91 U	<0.82 U	<0.82 U	<0.9 U	<0.81 U	<0.94 U	<0.94 U	<4.2 UJ	<4.2 UJ
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
2,6-Dinitrotoluene	606-20-2	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
2-Chloronaphthalene	91-58-7	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
2-Chlorophenol	95-57-8	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 UJ	<0.88 UJ
2-Methylnaphthalene	91-57-6	NS	NS	NS	mg/kg	0.059 J	<0.2 U	<0.24 U	<0.21 U	<0.22 U	<0.23 U	0.25	<0.2 U	<0.22 U	0.04 J	<0.23 U	<0.23 U	<1 U	<1 U
2-Methylphenol (o-Cresol)	95-48-7	0.33	0.33	100	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	0.027 J	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 UJ	<0.88 UJ
2-Nitroaniline	88-74-4	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
2-Nitrophenol	88-75-5	NS	NS	NS	mg/kg	<0.39 U	<0.37 U	<0.43 U	<0.38 U	<0.39 U	<0.41 U	<0.37 U	<0.37 U	<0.4 U	<0.36 U	<0.42 U	<0.42 U	<1.9 UJ	<1.9 UJ
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	0.33	100	mg/kg	<0.26 U	<0.25 U	<0.29 U	<0.25 U	<0.26 U	<0.27 U	0.086 J	<0.25 U	<0.27 U	<0.24 U	<0.28 U	<0.28 U	<1.2 UJ	<1.3 UJ
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
3-Nitroaniline	99-09-2	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	NS	NS	mg/kg	<0.47 U	<0.44 U	<0.52 U	<0.46 U	<0.47 U	<0.49 U	<0.44 U	<0.44 U	<0.49 U	<0.44 U	<0.51 U	<0.51 U	<2.3 UJ	<2.3 UJ
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
4-Chloro-3-Methylphenol	59-50-7	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 UJ	<0.88 UJ
4-Chloroaniline	106-47-8	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 UJ	<0.88 UJ
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
4-Nitroaniline	100-01-6	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
4-Nitrophenol	100-02-7	NS	NS	NS	mg/kg	<0.25 U	<0.24 U	<0.28 U	<0.25 U	<0.25 U	<0.26 U	<0.24 U	<0.24 U	<0.26 U	<0.24 U	<0.27 U	<0.27 U	<1.2 UJ	<1.2 UJ
Acenaphthene	83-32-9	20	98	100	mg/kg	0.18	<0.14 U	<0.16 U	0.028 J	0.022 J	<0.15 U	0.32	<0.14 U	<0.15 U	0.08 J	<0.16 U	<0.16 U	0.18 J	<0.7 U
Acenaphthylene	208-96-8	100	107	100	mg/kg	0.14	<0.14 U	<0.16 U	0.067 J	<0.14 U	<0.15 U	1.1	<0.14 U	<0.15 U	0.11 J	0.062 J	<0.16 U	<0.7 U	<0.7 U
Acetophenone	98-86-2	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
Anthracene	120-12-7	100	1000	100	mg/kg	0.44	<0.1 U	<0.12 U	0.093 J	0.045 J	<0.11 U	2	<0.1 U	<0.11 U	0.24	0.086 J	<0.12 U	0.4 J	0.23 J
Benzo(a)anthracene	56-55-3	**1**	1	1	mg/kg	**1.8**	<0.1 U	<0.12 U	0.52	0.13	<0.11 U	**9**	0.16	0.03 J	0.96	0.29	<0.12 U	0.75	0.82
Benzo(a)pyrene	50-32-8	**1**	22	1	mg/kg	**1.9**	<0.14 U	<0.16 U	0.64	0.13 J	<0.15 U	**9.3**	0.17	<0.15 U	**1.2**	0.31	<0.16 U	0.74	0.86
Benzo(b)fluoranthene	205-99-2	**1**	1.7	1	mg/kg	**2.3**	<0.1 U	<0.12 U	0.76	0.16	<0.11 U	**9.6**	0.19	0.034 J	**1.3**	0.36	<0.12 U	0.96	**1.1**
Benzo(g,h,i)Perylene	191-24-2	100	1000	100	mg/kg	0.93	<0.14 U	<0.16 U	0.33	0.065 J	<0.15 U	4	0.082 J	<0.15 U	0.72	0.17	<0.16 U	0.38 J	0.42 J
Benzo(k)fluoranthene	207-08-9	**0.8**	1.7	3.9	mg/kg	**0.84**	<0.1 U	<0.12 U	0.28	0.05 J	<0.11 U	**2.8**	0.08 J	<0.11 U	0.42	0.13	<0.12 U	0.31 J	0.42 J
Benzoic Acid	65-85-0	NS	NS	NS	mg/kg	<0.58 U	<0.56 U	<0.65 U	<0.57 U	<0.58 U	<0.62 U	<0.55 U	<0.55 U	<0.61 U	<0.55 U	<0.63 U	<0.63 U	<2.8 UJ	<2.8 UJ
Benzyl Alcohol	100-51-6	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	2.6 J	<0.88 UJ
Benzyl Butyl Phthalate	85-68-7	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	0.082 J	0.096 J	<0.2 U	0.64 J	0.72 J
Biphenyl (Diphenyl)	92-52-4	NS	NS	NS	mg/kg	<0.41 U	<0.39 U	<0.46 U	<0.4 U	<0.41 U	<0.43 U	0.099 J	<0.39 U	<0.43 U	<0.38 U	<0.44 U	<0.45 U	<2 U	<2 U
Bis(2-chloroethoxy) methane	111-91-1	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.22 U	<0.19 U	<0.19 U	<0.2 U	<0.18 U	<0.18 U	<0.2 U	<0.18 U	<0.21 U	<0.21 U	<0.94 U	<0.95 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	NS	NS	mg/kg	<0.16 U	<0.15 U	<0.18 U	<0.16 U	<0.16 U	<0.17 U	<0.15 U	<0.15 U	<0.17 U	<0.15 U	<0.18 U	<0.18 U	<0.78 U	<0.79 U
Bis(2-chloroisopropyl) ether	108-60-1	NS	NS	NS	mg/kg	<0.22 U	<0.2 U	<0.24 U	<0.21 U	<0.22 U	<0.23 U	<0.2 U	<0.2 U	<0.22 U	<0.2 U	<0.23 U	<0.23 U	<1 U	<1 U
Bis(2-ethylhexyl) phthalate	117-81-7	NS	NS	NS	mg/kg	0.085 J	0.065 J	0.072 J	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	0.098 J	0.12 J	<0.2 U	0.46 J	0.67 J
Carbazole	86-74-8	NS	NS	NS	mg/kg	0.2	<0.17 U	<0.2 U	0.053 J	0.018 J	<0.19 U	0.47	<0.17 U	<0.19 U	0.11 J	0.021 J	<0.2 U	0.14 J	0.11 J
Chrysene	218-01-9	**1**	1	3.9	mg/kg	**1.7**	<0.1 U	<0.12 U	0.56	0.13	<0.11 U	**6.5**	0.15	0.029 J	0.93	0.28	<0.12 U	0.83	0.87
Dibenz(a,h)anthracene	53-70-3	**0.33**	1000	0.33	mg/kg	0.23	<0.1 U	<0.12 U	0.082 J	<0.11 U	<0.11 U	**0.76**	0.02 J	<0.11 U	0.15	0.037 J	<0.12 U	<0.52 U	0.11 J
Dibenzofuran	132-64-9	7	210	59	mg/kg	0.089 J	<0.17 U	<0.2 U	0.02 J	<0.18 U	<0.19 U	0.29	<0.17 U	<0.19 U	0.049 J	<0.19 U	<0.2 U	0.15 J	<0.88 U
Dibutyl phthalate	84-74-2	NS	NS	NS	mg/kg	0.036 J	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
Diethyl phthalate	84-66-2	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
Dimethyl phthalate	131-11-3	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
Dioctyl phthalate	117-84-0	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	0.66 J
Fluoranthene	206-44-0	**100**	1000	100	mg/kg	3.6	<0.1 U	<0.12 U	1	0.3	<0.11 U	13	0.32	0.054 J	1.9	0.64	<0.12 U	1.9	1.8
Fluorene	86-73-7	30	386	100	mg/kg	0.18	<0.17 U	<0.2 U	0.025 J	<0.18 U	<0.19 U	0.57	<0.17 U	<0.19 U	0.074 J	0.038 J	<0.2 U	0.18 J	<0.88 U
Hexachlorobenzene	118-74-1	0.33	3.2	1.2	mg/kg	<0.11 U	<0.1 U	<0.12 U	<0.1 U	<0.11 U	<0.11 U	<0.1 U	<0.1 U	<0.11 U	<0.1 U	<0.12 U	<0.12 U	<0.52 U	<0.52 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	mg/kg	<0.52 U	<0.49 U	<0.57 U	<0.5 U	<0.52 U	<0.54 U	<0.49 U	<0.49 U	<0.54 U	<0.48 U	<0.56 U	<0.56 U	<2.5 UJ	<2.5 UJ
Hexachloroethane	67-72-1	NS	NS	NS	mg/kg	<0.14 U	<0.14 U	<0.16 U	<0.14 U	<0.14 U	<0.15 U	<0.14 U	<0.14 U	<0.15 U	<0.14 U	<0.16 U	<0.16 U	<0.7 U	<0.7 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	8.2	0.5	mg/kg	**1.1**	<0.14 U	<0.16 U	0.42	0.082 J	<0.15 U	**4.6**	0.1 J	<0.15 U	**0.83**	0.19	<0.16 U	0.44 J	0.47 J
Isophorone	78-59-1	NS	NS	NS	mg/kg	<0.16 U	<0.15 U	<0.18 U	<0.16 U	<0.16 U	<0.17 U	<0.15 U	<0.15 U	<0.17 U	<0.15 U	<0.18 U	<0.18 U	<0.78 U	<0.79 U
Naphthalene	91-20-3	**12**	12	100	mg/kg	0.074 J	<0.17 U	<0.2 U	0.038 J	<0.18 U	<0.19 U	0.48	<0.17 U	<0.19 U	0.079 J	0.03 J	<0.2 U	<0.87 U	<0.88 U
Nitrobenzene	98-95-3	NS	NS	NS	mg/kg	<0.16 U	<0.15 U	<0.18 U	<0.16 U	<0.16 U	<0.17 U	<0.15 U	<0.15 U	<0.17 U	<0.15 U	<0.18 U	<0.18 U	<0.78 U	<0.79 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	NS	NS	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 U	<0.88 U
n-Nitrosodiphenylamine	86-30-6	NS	NS	NS	mg/kg	<0.14 U	<0.14 U	<0.16 U	<0.14 U	<0.14 U	<0.15 U	<0.14 U	<0.14 U	<0.15 U	<0.14 U	<0.16 U	<0.16 U	<0.7 U	<0.7 U
Pentachlorophenol	87-86-5	0.8	0.8	6.7	mg/kg	<0.14 U	<0.14 U	<0.16 U	<0.14 U	<0.14 U	<0.15 U	<0.14 U	<0.14 U	<0.15 U	<0.14 U	<0.16 U	<0.16 U	<0.7 UJ	<0.7 UJ
Phenanthrene	85-01-8	100	1000	100	mg/kg	2.2	<0.1 U	<0.12 U	0.45	0.25	<0.11 U	6	0.14	0.027 J	1	0.46	<0.12 U	1.7	1.1
Phenol	108-95-2	0.33	0.33	100	mg/kg	<0.18 U	<0.17 U	<0.2 U	<0.18 U	<0.18 U	<0.19 U	0.047 J	<0.17 U	<0.19 U	<0.17 U	<0.19 U	<0.2 U	<0.87 UJ	<0.88 UJ
Pyrene	129-00-0	**100**	1000	100	mg/kg	3.2	<0.1 U	<0.12 U	0.95	0.27	<0.11 U	16	0.28	0.05 J	1.9	0.69	<0.12 U	1.6	1.5

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB19	SB19	SB19	SB20	SB20	SB20	SB21	SB21	SB21	SB22	SB22	SB22	SB23	SB24
					Sample Name	SB19_0-2	SB19_2-4	SB19_6-8	SB20_0-2	SB20_2-4	SB20_5-7	SB21_0-2	SB21_2-4	SB21_6-8	SB22_0-2	SB22_4-6	SB22_7-9	SB23_0-2	SB24_0-2
					Sample Date	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/30/2023	05/30/2023
					Sample Depth	0-2	2-4	6-8	0-2	2-4	5-7	0-2	2-4	6-8	0-2	4-6	7-9	0-2	0-2
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																			
4,4'-DDD	72-54-8	**0.0033**	14	13	mg/kg	0.00235	<0.0016 U	<0.00189 U	0.00093 J	<0.00174 U	<0.00186 U	<0.00163 U	<0.00163 U	<0.00174 U	<0.00166 U	<0.0019 U	<0.0018 U	0.00221	0.00179
4,4'-DDE	72-55-9	**0.0033**	17	8.9	mg/kg	**0.00431**	<0.0016 U	<0.00189 U	0.00124 J	<0.00174 U	<0.00186 U	<0.00163 U	<0.00163 U	<0.00174 U	0.00103 J	0.000494 J	<0.0018 U	**0.0121**	**0.011**
4,4'-DDT	50-29-3	**0.0033**	136	7.9	mg/kg	**0.0091**	<0.0016 U	<0.00189 U	0.00305	<0.00174 U	<0.00186 U	<0.00163 U	<0.00163 U	<0.00174 U	<0.00166 U	<0.0019 U	<0.0018 U	0.00246 J	**0.00357 J**
Aldrin	309-00-2	**0.005**	0.19	0.097	mg/kg	<0.00176 U	<0.0016 U	<0.00189 U	<0.00166 U	<0.00174 U	<0.00186 U	<0.00163 U	<0.00163 U	<0.00174 U	<0.00166 U	<0.0019 U	<0.0018 U	0.00493	0.00277
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	0.02	0.48	mg/kg	<0.000734 U	<0.000668 U	<0.000786 U	<0.000694 U	<0.000724 U	<0.000777 U	<0.000679 U	<0.00068 U	<0.000727 U	<0.000692 U	<0.000793 U	<0.00075 U	<0.00071 U	<0.000709 U
Alpha Chlordane	5103-71-9	**0.094**	2.9	4.2	mg/kg	0.000894 J	<0.002 U	<0.00236 U	<0.00208 U	<0.00217 U	<0.00233 U	0.00221	<0.00204 U	<0.00218 U	0.00201 J	0.001 J	<0.00225 U	0.04	0.0153 J
Alpha Endosulfan	959-98-8	2.4	102	24	mg/kg	<0.00176 U	<0.0016 U	<0.00189 U	<0.00166 U	<0.00174 U	<0.00186 U	<0.00163 U	<0.00163 U	<0.00174 U	<0.00166 U	<0.0019 U	<0.0018 U	<0.0017 U	<0.0017 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	0.09	0.36	mg/kg	<0.00176 U	<0.0016 U	<0.00189 U	<0.00166 U	<0.00174 U	<0.00186 U	<0.00163 U	<0.00163 U	<0.00174 U	<0.00166 U	<0.0019 U	<0.0018 U	<0.0017 U	<0.0017 U
Beta Endosulfan	33213-65-9	2.4	102	24	mg/kg	<0.00176 U	<0.0016 U	<0.00189 U	<0.00166 U	<0.00174 U	<0.00186 U	<0.00163 U	<0.00163 U	<0.00174 U	<0.00166 U	<0.0019 U	<0.0018 U	<0.0017 U	<0.0017 U
Chlordane (alpha and gamma)	57-74-9	NS	NS	NS	mg/kg	<0.0147 U	<0.0134 U	<0.0157 U	<0.0139 U	<0.0145 U	<0.0155 U	<0.0136 U	<0.0136 U	<0.0145 U	<0.0138 U	<0.0159 U	<0.015 U	0.306	0.183
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	0.25	100	mg/kg	<0.00176 U	<0.0016 U	<0.00189 U	<0.00166 U	<0.00174 U	<0.00186 U	<0.00163 U	<0.00163 U	<0.00174 U	<0.00166 U	<0.0019 U	<0.0018 U	<0.0017 U	<0.0017 U
Dieldrin	60-57-1	**0.005**	0.1	0.2	mg/kg	<0.0011 U	<0.001 U	<0.00118 U	<0.00104 U	<0.00109 U	<0.00116 U	<0.00102 U	<0.00102 U	<0.00109 U	<0.00104 U	<0.00119 U	<0.00112 U	**0.00747**	0.00405
Endosulfan Sulfate	1031-07-8	2.4	1000	24	mg/kg	<0.000734 U	<0.000668 U	<0.000786 U	0.000401 J	<0.000724 U	<0.000777 U	<0.000679 U	<0.00068 U	<0.000727 U	<0.000692 U	<0.000793 U	<0.00075 U	<0.00071 U	<0.000709 U
Endrin	72-20-8	0.014	0.06	11	mg/kg	<0.000734 U	<0.000668 U	<0.000786 U	<0.000694 U	<0.000724 U	<0.000777 U	<0.000679 U	<0.00068 U	<0.000727 U	<0.000692 U	<0.000793 U	<0.00075 U	<0.00071 U	<0.000709 U
Endrin Aldehyde	7421-93-4	NS	NS	NS	mg/kg	<0.0022 U	<0.002 U	<0.00236 U	<0.00208 U	<0.00217 U	<0.00233 U	<0.00204 U	<0.00204 U	<0.00218 U	<0.00208 U	<0.00238 U	<0.00225 U	<0.00213 U	<0.00213 U
Endrin Ketone	53494-70-5	NS	NS	NS	mg/kg	<0.00176 U	<0.0016 U	<0.00189 U	<0.00166 U	<0.00174 U	<0.00186 U	<0.00163 U	<0.00163 U	<0.00174 U	<0.00166 U	<0.0019 U	<0.0018 U	<0.0017 U	<0.0017 U
Gamma Bhc (Lindane)	58-89-9	0.1	0.1	1.3	mg/kg	<0.000734 U	<0.000668 U	<0.000786 U	<0.000694 U	<0.000724 U	<0.000777 U	<0.000679 U	<0.00068 U	<0.000727 U	<0.000692 U	<0.000793 U	<0.00075 U	<0.00071 U	<0.000709 U
Gamma Chlordane (Trans)	5103-74-2	NS	NS	NS	mg/kg	0.00106 J	<0.002 U	<0.00236 U	0.000628 J	<0.00217 U	<0.00233 U	0.00234 J	<0.00204 U	<0.00218 U	0.00243	0.000846 J	<0.00225 U	0.0361	0.0215
Heptachlor	76-44-8	0.042	0.38	2.1	mg/kg	<0.000881 U	<0.000801 U	<0.000943 U	<0.000832 U	<0.000869 U	<0.000932 U	<0.000815 U	<0.000816 U	<0.000873 U	<0.000831 U	<0.000952 U	<0.0009 U	0.0042	0.00306
Heptachlor Epoxide	1024-57-3	NS	NS	NS	mg/kg	<0.0033 U	<0.003 U	<0.00354 U	<0.00312 U	<0.00326 U	<0.0035 U	<0.00306 U	<0.00306 U	<0.00327 U	<0.00311 U	<0.00357 U	<0.00338 U	0.00191 J	0.00126 J
Methoxychlor	72-43-5	NS	NS	NS	mg/kg	<0.0033 U	<0.003 U	<0.00354 U	<0.00312 U	<0.00326 U	<0.0035 U	<0.00306 U	<0.00306 U	<0.00327 U	<0.00311 U	<0.00357 U	<0.00338 U	<0.0032 U	<0.00319 U
Toxaphene	8001-35-2	NS	NS	NS	mg/kg	<0.033 U	<0.03 U	<0.0354 U	<0.0312 U	<0.0326 U	<0.035 U	<0.0306 U	<0.0306 U	<0.0327 U	<0.0311 U	<0.0357 U	<0.0338 U	<0.032 U	<0.0319 U
Herbicides																			
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	NS	NS	mg/kg	<0.184 U	<0.17 U	<0.202 U	<0.176 U	<0.179 U	<0.192 U	<0.175 U	<0.174 U	<0.188 U	<0.17 U	<0.197 U	<0.193 U	<0.176 U	<0.176 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	NS	NS	mg/kg	<0.184 U	<0.17 U	<0.202 U	<0.176 U	<0.179 U	<0.192 U	<0.175 U	<0.174 U	<0.188 U	<0.17 U	<0.197 U	<0.193 U	<0.176 U	<0.176 U
Silvex (2,4,5-Tp)	93-72-1	3.8	3.8	100	mg/kg	<0.184 U	<0.17 U	<0.202 U	<0.176 U	<0.179 U	<0.192 U	<0.175 U	<0.174 U	<0.188 U	<0.17 U	<0.197 U	<0.193 U	<0.176 U	<0.176 U
Polychlorinated Biphenyl																			
PCB-1016 (Aroclor 1016)	12674-11-2	NS	NS	NS	mg/kg	<0.0533 U	<0.0474 U	<0.0586 U	<0.0509 U	<0.0503 U	<0.0561 U	<0.0495 U	<0.0492 U	<0.0538 U	<0.0499 U	<0.0594 U	<0.0556 U	<0.0519 U	<0.052 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	NS	NS	mg/kg	<0.0533 U	<0.0474 U	<0.0586 U	<0.0509 U	<0.0503 U	<0.0561 U	<0.0495 U	<0.0492 U	<0.0538 U	<0.0499 U	<0.0594 U	<0.0556 U	<0.0519 U	<0.052 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	NS	NS	mg/kg	<0.0533 U	<0.0474 U	<0.0586 U	<0.0509 U	<0.0503 U	<0.0561 U	<0.0495 U	<0.0492 U	<0.0538 U	<0.0499 U	<0.0594 U	<0.0556 U	<0.0519 U	<0.052 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	NS	NS	mg/kg	<0.0533 U	<0.0474 U	<0.0586 U	<0.0509 U	<0.0503 U	<0.0561 U	<0.0495 U	<0.0492 U	<0.0538 U	<0.0499 U	<0.0594 U	<0.0556 U	<0.0519 U	<0.052 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	NS	NS	mg/kg	<0.0533 U	<0.0474 U	<0.0586 U	<0.0509 U	<0.0503 U	<0.0561 U	<0.0495 U	<0.0492 U	<0.0538 U	<0.0499 U	<0.0594 U	<0.0556 U	<0.0519 U	<0.052 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	NS	NS	mg/kg	<0.0533 U	<0.0474 U	<0.0586 U	<0.0509 U	<0.0503 U	<0.0561 U	<0.0495 U	<0.0492 U	<0.0538 U	<0.0499 U	<0.0594 U	<0.0556 U	0.0483 J	0.0286 J
PCB-1260 (Aroclor 1260)	11096-82-5	NS	NS	NS	mg/kg	<0.0533 U	<0.0474 U	<0.0586 U	<0.0509 U	<0.0503 U	<0.0561 U	0.0192 J	<0.0492 U	<0.0538 U	0.0249 J	<0.0594 U	<0.0556 U	<0.0519 U	<0.052 U
PCB-1262 (Aroclor 1262)	37324-23-5	NS	NS	NS	mg/kg	<0.0533 U	<0.0474 U	<0.0586 U	<0.0509 U	<0.0503 U	<0.0561 U	<0.0495 U	<0.0492 U	<0.0538 U	<0.0499 U	<0.0594 U	<0.0556 U	<0.0519 U	<0.052 U
PCB-1268 (Aroclor 1268)	11100-14-4	NS	NS	NS	mg/kg	0.0137 J	<0.0474 U	<0.0586 U	<0.0509 U	<0.0503 U	<0.0561 U	0.00775 J	<0.0492 U	<0.0538 U	<0.0499 U	<0.0594 U	<0.0556 U	<0.0519 U	<0.052 U
Total PCBs	1336-36-3	0.1	3.2	1	mg/kg	0.0137 J	<0.0474 U	<0.0586 U	<0.0509 U	<0.0503 U	<0.0561 U	0.027 J	<0.0492 U	<0.0538 U	0.0249 J	<0.0594 U	<0.0556 U	0.0483 J	0.0286 J
Metals																			
Aluminum	7429-90-5	NS	NS	NS	mg/kg	3,610	597	740	2,240	694	700	2,310	552	692	2,490	1,030	897	5,390	5,710
Antimony	7440-36-0	NS	NS	NS	mg/kg	4.7	<3.93 U	<4.62 U	2.67 J	0.756 J	<4.42 U	2.58 J	<3.96 U	<4.39 U	1.31 J	<4.6 U	0.643 J	0.938 J	1.15 J
Arsenic	7440-38-2	13	16	16	mg/kg	6.72	1.02	1.21	4.07	1.2	0.895	3.19	0.711 J	0.381 J	3.16	2.13	0.941	3.82	4.19
Barium	7440-39-3	**350**	820	400	mg/kg	170	10.9	3.65	79.3	21.1	2.98	64.7	9.17	4.32	78.5	7.02	2.43	64.4	68.6
Beryllium	7440-41-7	7.2	47	72	mg/kg	0.276 J	0.106 J	0.073 J	0.212 J	0.074 J	0.052 J	0.33 J	0.063 J	0.057 J	0.219 J	0.085 J	0.07 J	0.316 J	0.39 J
Cadmium	7440-43-9	2.5	7.5	4.3	mg/kg	1.06	<0.786 U	<0.925 U	0.441 J	0.109 J	<0.885 U	0.405 J	<0.792 U	<0.879 U	0.326 J	<0.92 U	<0.903 U	0.259 J	0.137 J
Calcium	7440-70-2	NS	NS	NS	mg/kg	11,700	526	319	3,540	488	254	10,900	310	223	7,220	994	241	30,200	34,200
Chromium, Hexavalent	18540-29-9	**1**	19	110	mg/kg	0.199 J	<0.83 U	<0.973 U	<0.866 U	<0.881 U	<0.936 U	<0.842 U	0.189 J	<0.926 U	0.303 J	<0.962 U	<0.955 U	0.475 J	0.76 J
Chromium, Total	7440-47-3	NS	NS	NS	mg/kg	14.3	6.11	4.01	9.44	5.38	2.81	12.6	3.79	3.55	15.3	5.05	3.03	23.6	27.3
Chromium, Trivalent	16065-83-1	**30**	NS	180	mg/kg	14.1 J	6.11	4.01	9.44	5.38	2.81	12.6	3.6 J	3.55	15 J	5.05	3.03	23.1 J	26.5 J
Cobalt	7440-48-4	NS	NS	NS	mg/kg	5.05	0.378 J	0.7 J	3.01	0.72 J	0.429 J	3.42	0.473 J	0.562 J	2.36	1.86	0.92 J	4.25	5.03
Copper	7440-50-8	**50**	1720	270	mg/kg	**149**	3.23	1.09	**152**	25.6	1.08	**71.9**	8.01	1.2	38.1	3.84	1.19	19.1	30.8
Cyanide	57-12-5	27	40	27	mg/kg	<1.1 U	<1 U	<1.2 U	<1 U	<1 U	<1.1 U	<0.97 UJ	<0.97 UJ	<1.1 UJ	<0.97 UJ	<1.2 UJ	<1.2 UJ	0.23 J	<1 U
Iron	7439-89-6	NS	NS	NS	mg/kg	17,900	2,080	1,930	11,200	2,880	1,650	10,300	1,500	1,340	7,130	2,860	2,050	9,420	11,200
Lead	7439-92-1	**63**	450	400	mg/kg	**359**	5.2	1.84 J	**228**	57	2.4 J	**171**	15.3	1.24 J	**238**	6.36	0.973 J	49.6	42.8
Magnesium	7439-95-4	NS	NS	NS	mg/kg	2,500	212	329	1,200	322	309	4,320	202	306	1,280	554	437	5,910	5,990
Manganese	7439-96-5	1600	2000	2000	mg/kg	225	32.2	15.9	145	34.3	11.1	125	21.9	11.3	120	23.6	18.2	169	191
Mercury	7439-97-6	**0.18**	0.73	0.81	mg/kg	0.174	<0.067 U	<0.078 U	0.167	<0.071 U	<0.078 U	**0.196**	<0.069 U	<0.082 U	**0.378**	<0.077 U	<0.086 U	0.065 J	0.068 J
Nickel	7440-02-0	30	130	310	mg/kg	18	1.55 J	3.15	13.1	3.57	2.46	13.8	2.17	2.42	10.2	5.78	4.56	12.4	15.9
Potassium	7440-09-7	NS	NS	NS	mg/kg	347	95.3 J	145 J	321	115 J	124 J	359	95.4 J	127 J	332	166 J	151 J	1,600	1,600
Selenium	7782-49-2	3.9	4	180	mg/kg	<1.68 U	<1.57 U	<1.85 U	<1.63 U	<1.66 U	<1.77 U	<1.58 U	<1.58 U	<1.76 U	<1.59 U	<1.84 U	<1.8 U	0.235 J	<1.62 U
Silver	7440-22-4	2	8.3	180	mg/kg	0.312 J	<0.393 U	<0.462 U	<0.408 U	<0.416 U	<0.442 U	<0.396 U	<0.396 U	<0.439 U	<0.398 U	<0.46 U	<0.451 U	<0.415 U	<0.406 U
Sodium	7440-23-5	NS	NS	NS	mg/kg	<168 U	<157 U	<185 U	<163 U	<166 U	<177 U	196	<158 U	<176 U	<159 U	<184 U	<180 U	380	302
Thallium	7440-28-0	NS	NS	NS	mg/kg	<1.68 U	<1.57 U	<1.85 U	<1.63 U	<1.66 U	<1.77 U	<1.58 U	<1.58 U	<1.76 U	<1.59 U	<1.84 U	<1.8 U	0.296 J	0.363 J
Vanadium	7440-62-2	NS	NS	NS	mg/kg	14.4	5.55	3.46	13.1	3.66	2.89	14.5	2.73	2.61	10.9	3.58	2.78	20.8	20.7
Zinc	7440-66-6	**109**	2480	10000	mg/kg	**276**	8.83	19.5	**147**	38.4	17.3	**226**	15	15.2	**110**	41.8	6.61	50.9	56.9
General Chemistry																			
Total Solids	TSOLID	NS	NS	NS	Percent	90.3	96.4	82.2	92.4	90.8	85.5	95	95.1	86.4	95.8	83.2	83.8	92.6	93.4

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB19	SB19	SB19	SB20	SB20	SB20	SB21	SB21	SB21	SB22	SB22	SB22	SB23	SB24
					Sample Name	SB19_0-2	SB19_2-4	SB19_6-8	SB20_0-2	SB20_2-4	SB20_5-7	SB21_0-2	SB21_2-4	SB21_6-8	SB22_0-2	SB22_4-6	SB22_7-9	SB23_0-2	SB24_0-2
					Sample Date	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/22/2023	05/30/2023	05/30/2023
					Sample Depth	0-2	2-4	6-8	0-2	2-4	5-7	0-2	2-4	6-8	0-2	4-6	7-9	0-2	0-2
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances																			
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	763051-92-9	NS	NS	NS	mg/kg	<0.00078 U	<0.000719 U	<0.000735 U	<0.000754 U	<0.000723 U	<0.000758 U	<0.00073 U	<0.000713 U	<0.000738 U	<0.000748 U	<0.000722 U	<0.000775 U	<0.00078 U	<0.000794 U
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2FTS)	39108-34-4	NS	NS	NS	mg/kg	<0.00078 U	<0.000719 U	<0.000735 U	<0.000754 UJ	<0.000723 U	<0.000758 U	<0.00073 UJ	<0.000713 U	<0.000738 U	<0.000748 U	<0.000722 U	<0.000775 U	0.00343	0.00102
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	NS	NS	mg/kg	<0.00078 U	<0.000719 U	<0.000735 U	<0.000754 U	<0.000723 U	<0.000758 U	<0.00073 U	<0.000713 U	<0.000738 U	<0.000748 U	<0.000722 U	<0.000775 U	<0.00078 U	<0.000794 U
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2FTS)	27619-97-2	NS	NS	NS	mg/kg	<0.00078 U	<0.000719 U	<0.000735 U	<0.000754 U	<0.000723 U	<0.000758 U	<0.00073 U	<0.000713 U	<0.000738 U	<0.000748 U	<0.000722 U	<0.000775 U	0.0011	0.000373 J
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3FTCA)	914637-49-3	NS	NS	NS	mg/kg	<0.00487 U	<0.00449 U	<0.00459 U	<0.00471 U	<0.00452 U	<0.00474 U	<0.00456 U	<0.00446 U	<0.00461 U	<0.00468 U	<0.00451 U	<0.00484 U	<0.00487 U	<0.00496 U
3-Perfluoroheptyl Propanoic Acid (7:3FTCA)	812-70-4	NS	NS	NS	mg/kg	<0.00487 U	<0.00449 U	<0.00459 U	<0.00471 U	<0.00452 U	<0.00474 U	<0.00456 U	<0.00446 U	<0.00461 U	<0.00468 U	<0.00451 U	<0.00484 U	<0.00487 U	<0.00496 U
3-Perfluoropropyl Propanoic Acid (3:3FTCA)	356-02-5	NS	NS	NS	mg/kg	<0.000975 U	<0.000899 U	<0.000919 U	<0.000943 U	<0.000904 U	<0.000948 U	<0.000912 U	<0.000891 U	<0.000923 U	<0.000935 U	<0.000902 U	<0.000969 U	<0.000975 U	<0.000993 U
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	NS	NS	NS	mg/kg	<0.00078 U	<0.000719 U	<0.000735 U	<0.000754 U	<0.000723 U	<0.000758 U	<0.00073 U	<0.000713 U	<0.000738 U	<0.000748 U	<0.000722 U	<0.000775 U	<0.00078 U	<0.000794 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid	756426-58-1	NS	NS	NS	mg/kg	<0.00078 U	<0.000719 U	<0.000735 U	<0.000754 U	<0.000723 U	<0.000758 U	<0.00073 U	<0.000713 U	<0.000738 U	<0.000748 U	<0.000722 U	<0.000775 U	<0.00078 U	<0.000794 U
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	NS	NS	mg/kg	<0.00078 U	<0.000719 U	<0.000735 U	<0.000754 U	<0.000723 U	<0.000758 U	<0.00073 U	<0.000713 U	<0.000738 U	<0.000748 U	<0.000722 U	<0.000775 U	<0.00078 U	<0.000794 U
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	<0.000187 U	<0.00018 U	<0.000194 U	<0.000195 U	<0.000199 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 UJ	<0.000181 U	<0.00019 U	<0.000182 UJ	<0.000178 U	<0.000184 U	<0.000187 U	0.000188	<0.000194 U	<0.000195 U	<0.000199 U
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	NS	NS	mg/kg	<0.00195 U	<0.0018 U	<0.00184 U	<0.00188 U	<0.00181 U	<0.0019 U	<0.00182 U	<0.00178 U	<0.00184 U	<0.00187 U	<0.0018 U	<0.00194 U	<0.00195 U	<0.00199 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	<0.000187 U	<0.00018 U	<0.000194 U	<0.000195 U	<0.000199 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA	2355-31-9	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 UJ	<0.000181 U	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	<0.000187 U	<0.00018 U	<0.000194 U	<0.000195 U	<0.000199 U
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	NS	NS	mg/kg	<0.00195 U	<0.0018 U	<0.00184 U	<0.00188 U	<0.00181 U	<0.0019 U	<0.00182 U	<0.00178 U	<0.00184 U	<0.00187 U	<0.0018 U	<0.00194 U	<0.00195 U	<0.00199 U
Nonafluoro-3,6-dioxaheptanoic acid	151772-58-6	NS	NS	NS	mg/kg	<0.00039 U	<0.00036 U	<0.000368 U	<0.000377 U	<0.000362 U	<0.000379 U	<0.000365 U	<0.000356 U	<0.000369 U	<0.000374 U	<0.000361 U	<0.000387 U	<0.00039 U	<0.000397 U
Perfluoro(2-ethoxyethane)sulfonic acid	113507-82-7	NS	NS	NS	mg/kg	<0.00039 U	<0.00036 U	<0.000368 U	<0.000377 U	<0.000362 U	<0.000379 U	<0.000365 U	<0.000356 U	<0.000369 U	<0.000374 U	<0.000361 U	<0.000387 U	<0.00039 U	<0.000397 U
Perfluoro-3-methoxypropanoic acid	377-73-1	NS	NS	NS	mg/kg	<0.00039 U	<0.00036 U	<0.000368 U	<0.000377 U	<0.000362 U	<0.000379 U	<0.000365 U	<0.000356 U	<0.000369 U	<0.000374 U	<0.000361 U	<0.000387 U	<0.00039 U	<0.000397 U
Perfluoro-4-methoxybutanoic acid	863090-89-5	NS	NS	NS	mg/kg	<0.00039 U	<0.00036 U	<0.000368 U	<0.000377 U	<0.000362 U	<0.000379 U	<0.000365 U	<0.000356 U	<0.000369 U	<0.000374 U	<0.000361 U	<0.000387 U	<0.00039 U	<0.000397 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	0.000044 J	<0.000178 U	<0.000184 U	0.000045 J	<0.00018 U	<0.000194 U	<0.000195 U	<0.000199 U
Perfluorobutanoic acid (PFBA)	375-22-4	NS	NS	NS	mg/kg	<0.00078 U	<0.000719 U	<0.000735 U	<0.000754 U	<0.000723 U	<0.000758 U	<0.00073 U	<0.000713 U	<0.000738 U	<0.000748 U	<0.000722 UJ	<0.000775 U	0.00007 J	0.000064 J
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	0.000088 J	0.000064 J	<0.000184 U	0.000112 J	0.00013 J	<0.000194 U	<0.000195 U	<0.000199 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	0.000142 J	<0.00018 U	<0.000194 U	0.000218	<0.000199 U
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	<0.000187 U	<0.00018 U	<0.000194 U	<0.000195 U	<0.000199 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	0.000067 J	0.000094 J	<0.000194 U	0.000086 J	<0.000199 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	<0.000187 U	<0.00018 U	<0.000194 U	<0.000195 U	0.000079 J
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	NS	NS	mg/kg	0.000047 J	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	0.000037 J	<0.00018 U	<0.000194 U	0.000055 J	0.000064 J
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	NS	NS	mg/kg	0.000179 J	0.000058 J	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	<0.000187 U	<0.00018 U	<0.000194 U	0.000078 J	<0.000199 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	NS	NS	mg/kg	0.000109 J	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	0.000044 J	<0.000178 U	<0.000184 U	0.000105 J	<0.00018 U	<0.000194 U	0.000242	0.000183 J
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	<0.000187 U	<0.00018 U	<0.000194 U	<0.000195 U	<0.000199 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	<0.000187 U	<0.00018 U	<0.000194 U	0.000717	0.000246
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	<0.000187 U	<0.00018 U	<0.000194 U	0.00007 J	<0.000199 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	0.001	0.044	mg/kg	**0.00092**	0.000086 J	0.000345	0.000332	0.000159 J	0.000273	0.000547	0.000121 J	<0.000184 U	**0.00104**	0.000137 J	<0.000194 U	**0.00425**	**0.00128**
Perfluorooctanoic Acid (PFOA)	335-67-1	0.00066	0.0008	0.033	mg/kg	0.000218	0.000244	0.000051 J	0.000075 J	0.000094 J	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	0.00009 J	<0.00018 U	<0.000194 U	0.000187 J	0.000151 J
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	NS	NS	mg/kg	<0.00039 U	<0.00036 U	<0.000368 U	<0.000377 U	<0.000362 U	<0.000379 U	<0.000365 U	<0.000356 U	<0.000369 U	0.00009 J	<0.000361 U	<0.000387 U	0.000086 J	0.000103 J
Perfluoropentansulfonic Acid (PFPeS)	2706-91-4	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	<0.000187 U	<0.00018 U	<0.000194 U	<0.000195 U	<0.000199 U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	<0.000187 U	<0.00018 U	<0.000194 U	<0.000195 U	<0.000199 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	<0.000187 U	0.000094 J	<0.000194 U	0.000265	0.000079 J
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	NS	NS	mg/kg	<0.000195 U	<0.00018 U	<0.000184 U	<0.000188 U	<0.000181 U	<0.00019 U	<0.000182 U	<0.000178 U	<0.000184 U	0.000075 J	0.000051 J	<0.000194 U	0.00154	0.000389 J

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB25	SB26	SB26	SB26	SB27	SB27	SB27	SB27	SB28	SB28	SB28	SB28	SB29	SB29	SB29
					Sample Name	SB25_0-2	SB26_0-2	SB26_3-5	SB26_5-7	SB27_0-2	SBDUP04_052523	SB27_3-5	SB27_6-8	SB28_0-2	SB28_2-4	SBDUP03_052523	SB28_6-8	SB29_0-2	SB29_3-5	SB29_5-7
					Sample Date	05/30/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/19/2023	05/19/2023	05/19/2023
					Sample Depth	0-2	0-2	3-5	5-7	0-2	0-2	3-5	6-8	0-2	2-4	2-4	6-8	0-2	3-5	5-7
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																				
1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	NS	mg/kg	<0.0005 U	<0.0005 U	<0.00054 U	<0.00051 U	<0.00049 U	<0.00086 U	<0.00053 U	<0.00062 U	<0.00055 U	<0.00066 U	<0.00064 U	<0.00069 U	<0.00071 U	<0.00072 U	<0.0005 U
1,1,1-Trichloroethane	71-55-6	0.68	0.68	100	mg/kg	<0.0005 U	<0.0005 U	<0.00054 U	<0.00051 U	<0.00049 U	<0.00086 U	<0.00053 U	<0.00062 U	<0.00055 U	<0.00066 U	<0.00064 U	<0.00069 U	<0.00071 U	<0.00072 U	<0.0005 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	mg/kg	<0.0005 U	<0.0005 U	<0.00054 U	<0.00051 U	<0.00049 U	<0.00086 U	<0.00053 U	<0.00062 U	<0.00055 U	<0.00066 U	<0.00064 U	<0.00069 U	<0.00071 U	<0.00072 U	<0.0005 U
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
1,1-Dichloroethane	75-34-3	0.27	0.27	26	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
1,1-Dichloroethene	75-35-4	0.33	0.33	100	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
1,1-Dichloropropene	563-58-6	NS	NS	NS	mg/kg	<0.0005 U	<0.0005 U	<0.00054 U	<0.00051 U	<0.00049 U	<0.00086 U	<0.00053 U	<0.00062 U	<0.00055 U	<0.00066 U	<0.00064 U	<0.00069 U	<0.00071 U	<0.00072 U	<0.0005 U
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
1,2,3-Trichloropropane	96-18-4	NS	NS	NS	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
1,2,4,5-Tetramethylbenzene	95-93-2	NS	NS	NS	mg/kg	0.00026 J	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
1,2,4-Trimethylbenzene	95-63-6	**3.6**	3.6	52	mg/kg	0.001 J	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	NS	NS	mg/kg	<0.003 U	<0.003 U	<0.0032 U	<0.0031 U	<0.003 U	<0.0052 U	<0.0032 U	<0.0037 U	<0.0033 U	<0.004 U	<0.0038 U	<0.0042 U	<0.0043 U	<0.0043 U	<0.003 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	NS	NS	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
1,2-Dichloroethane	107-06-2	0.02	0.02	3.1	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
1,2-Dichloropropane	78-87-5	NS	NS	NS	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	**8.4**	8.4	52	mg/kg	0.00042 J	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
1,3-Dichloropropane	142-28-9	NS	NS	NS	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
1,4-Diethyl Benzene	105-05-5	NS	NS	NS	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<0.08 U	<0.079 U	<0.086 U	<0.082 U	<0.079 U	<0.14 U	<0.084 U	<0.099 U	<0.088 U	<0.1 U	<0.1 U	<0.11 U	<0.11 U	<0.11 U	<0.08 U
2,2-Dichloropropane	594-20-7	NS	NS	NS	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
2-Chlorotoluene	95-49-8	NS	NS	NS	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
2-Hexanone (MBK)	591-78-6	NS	NS	NS	mg/kg	<0.01 UJ	<0.0099 U	<0.011 U	<0.01 U	<0.0099 U	<0.017 UJ	<0.01 UJ	<0.012 UJ	<0.011 U	<0.013 U	<0.013 U	<0.014 U	<0.014 U	<0.014 U	<0.01 U
4-Chlorotoluene	106-43-4	NS	NS	NS	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
4-Ethyltoluene	622-96-8	NS	NS	NS	mg/kg	0.00063 J	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
Acetone	67-64-1	**0.05**	0.05	100	mg/kg	0.021	0.0068 J	<0.011 U	<0.01 U	<0.0099 U	0.026	0.0067 J	0.0092 J	<0.011 U	0.0076 J	0.0067 J	<0.014 U	<0.014 U	0.013 J	<0.01 U
Acrylonitrile	107-13-1	NS	NS	NS	mg/kg	<0.004 U	<0.004 U	<0.0043 U	<0.0041 U	<0.0039 U	<0.0069 U	<0.0042 U	<0.0049 U	<0.0044 U	<0.0053 U	<0.0051 U	<0.0055 U	<0.0057 U	<0.0057 U	<0.004 U
Benzene	71-43-2	**0.06**	0.06	4.8	mg/kg	<0.0005 U	<0.0005 U	<0.00054 U	<0.00051 U	<0.00049 U	<0.00086 U	<0.00053 U	<0.00062 U	<0.00055 U	<0.00066 U	<0.00064 U	<0.00069 U	<0.00071 U	<0.00072 U	<0.0005 U
Bromobenzene	108-86-1	NS	NS	NS	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
Bromochloromethane	74-97-5	NS	NS	NS	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
Bromodichloromethane	75-27-4	NS	NS	NS	mg/kg	<0.0005 U	<0.0005 U	<0.00054 U	<0.00051 U	<0.00049 U	<0.00086 U	<0.00053 U	<0.00062 U	<0.00055 U	<0.00066 U	<0.00064 U	<0.00069 U	<0.00071 U	<0.00072 U	<0.0005 U
Bromoform	75-25-2	NS	NS	NS	mg/kg	<0.004 U	<0.004 U	<0.0043 U	<0.0041 U	<0.0039 U	<0.0069 U	<0.0042 U	<0.0049 U	<0.0044 U	<0.0053 U	<0.0051 U	<0.0055 U	<0.0057 U	<0.0057 U	<0.004 U
Bromomethane	74-83-9	NS	NS	NS	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
Carbon Disulfide	75-15-0	NS	NS	NS	mg/kg	<0.01 U	<0.0099 U	<0.011 U	<0.01 U	<0.0099 U	<0.017 U	<0.01 U	<0.012 U	<0.011 U	<0.013 U	<0.013 U	<0.014 U	<0.014 U	<0.014 U	<0.01 U
Carbon Tetrachloride	56-23-5	0.76	0.76	2.4	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
Chlorobenzene	108-90-7	1.1	1.1	100	mg/kg	<0.0005 U	<0.0005 U	<0.00054 U	<0.00051 U	<0.00049 U	<0.00086 U	<0.00053 U	<0.00062 U	<0.00055 U	<0.00066 U	<0.00064 U	<0.00069 U	<0.00071 U	<0.00072 U	<0.0005 U
Chloroethane	75-00-3	NS	NS	NS	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
Chloroform	67-66-3	0.37	0.37	49	mg/kg	<0.0015 U	<0.0015 U	0.00048 J	<0.0015 U	<0.0015 U	<0.0026 U	<0.0016 U	<0.0018 U	<0.0016 U	<0.002 U	<0.0019 U	<0.0021 U	<0.0021 U	<0.0021 U	<0.0015 U
Chloromethane	74-87-3	NS	NS	NS	mg/kg	<0.004 U	<0.004 U	<0.0043 U	<0.0041 U	<0.0039 U	<0.0069 U	<0.0042 U	<0.0049 U	<0.0044 U	<0.0053 U	<0.0051 U	<0.0055 U	<0.0057 U	<0.0057 U	<0.004 U
Cis-1,2-Dichloroethene	156-59-2	0.25	0.25	100	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	mg/kg	<0.0005 U	<0.0005 U	<0.00054 U	<0.00051 U	<0.00049 U	<0.00086 U	<0.00053 U	<0.00062 U	<0.00055 U	<0.00066 U	<0.00064 U	<0.00069 U	<0.00071 U	<0.00072 U	<0.0005 U
Cymene	99-87-6	NS	NS	NS	mg/kg	0.00012 J	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
Dibromochloromethane	124-48-1	NS	NS	NS	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
Dibromomethane	74-95-3	NS	NS	NS	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
Dichlorodifluoromethane	75-71-8	NS	NS	NS	mg/kg	<0.01 U	<0.0099 U	<0.011 U	<0.01 U	<0.0099 U	<0.017 U	<0.01 U	<0.012 U	<0.011 U	<0.013 U	<0.013 U	<0.014 U	<0.014 U	<0.014 U	<0.01 U
Diethyl Ether (Ethyl Ether)	60-29-7	NS	NS	NS	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
Ethylbenzene	100-41-4	**1**	1	41	mg/kg	0.00017 J	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	0.0003 J	<0.001 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.004 U	<0.004 U	<0.0043 U	<0.0041 U	<0.0039 U	<0.0069 U	<0.0042 U	<0.0049 U	<0.0044 U	<0.0053 U	<0.0051 U	<0.0055 U	<0.0057 U	<0.0057 U	<0.004 U
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
M,P-Xylene	179601-23-1	NS	NS	NS	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	0.0014 J	<0.002 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	0.12	100	mg/kg	<0.01 U	<0.0099 U	<0.011 U	<0.01 U	<0.0099 U	<0.017 UJ	<0.01 UJ	<0.012 UJ	<0.011 U	<0.013 U	<0.013 U	<0.014 U	<0.014 U	<0.014 U	<0.01 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	NS	NS	mg/kg	<0.01 U	<0.0099 U	<0.011 U	<0.01 U	<0.0099 U	<0.017 U	<0.01 U	<0.012 U	<0.011 U	<0.013 U	<0.013 U	<0.014 U	<0.014 U	<0.014 U	<0.01 U
Methylene Chloride	75-09-2	0.05	0.05	100	mg/kg	<0.005 U	<0.005 U	<0.0054 U	<0.0051 U	<0.0049 U	<0.0086 U	<0.0053 U	<0.0062 U	<0.0055 U	<0.0066 U	<0.0064 U	<0.0069 U	<0.0071 U	<0.0072 U	<0.005 U
Naphthalene	91-20-3	**12**	12	100	mg/kg	0.002 J	<0.004 U	<0.0043 U	<0.0041 U	<0.0039 U	<0.0069 U	<0.0042 U	<0.0049 U	<0.0044 U	<0.0053 U	0.0016 J	<0.0055 U	<0.0057 U	<0.0057 U	<0.004 U
n-Butylbenzene	104-51-8	**12**	12	100	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
n-Propylbenzene	103-65-1	**3.9**	3.9	100	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	NS	NS	mg/kg	0.00036 J	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	0.00054 J	<0.001 U
Sec-Butylbenzene	135-98-8	11	11	100	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
Styrene	100-42-5	NS	NS	NS	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
T-Butylbenzene	98-06-6	5.9	5.9	100	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
Tert-Butyl Methyl Ether	1634-04-4	0.93	0.93	100	mg/kg	<0.002 U	<0.002 U	<0.0021 U	<0.002 U	<0.002 U	<0.0034 U	<0.0021 U	<0.0025 U	<0.0022 U	<0.0026 U	<0.0026 U	<0.0028 U	<0.0028 U	<0.0029 U	<0.002 U
Tetrachloroethene (PCE)	127-18-4	**1.3**	1.3	19	mg/kg	<0.0005 U	0.00049 J	0.0034	<0.00051 U	0.0014	0.0016	0.0024	<0.00062 U	0.0019	0.0043 J	0.002 J	<0.00069 U	<0.00071 U	<0.00072 U	<0.0005 U
Toluene	108-88-3	**0.7**	0.7	100	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	NS	NS	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
Total Xylenes	1330-20-7	**0.26**	1.6	100	mg/kg	0.00036 J	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	0.0019 J	<0.001 U
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	NS	NS	NS	mg/kg	<0.0005 U	<0.0005 U	<0.00054 U	<0.00051 U	<0.00049 U	<0.00086 U	<0.00053 U	<0.00062 U	<0.00055 U	<0.00066 U	<0.00064 U	<0.00069 U	<0.00071 U	<0.00072 U	<0.0005 U
Trans-1,2-Dichloroethene	156-60-5	0.19	0.19	100	mg/kg	<0.0015 U	<0.0015 U	<0.0016 U	<0.0015 U	<0.0015 U	<0.0026 U	<0.0016 U	<0.0018 U	<0.0016 U	<0.002 U	<0.0019 U	<0.0021 U	<0.0021 U	<0.0021 U	<0.0015 U
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	NS	NS	mg/kg	<0.005 U	<0.005 U	<0.0054 U	<0.0051 U	<0.0049 U	<0.0086 U	<0.0053 U	<0.0062 U	<0.0055 U	<0.0066 U	<0.0064 U	<0.0069 U	<0.0071 U	<0.0072 U	<0.005 U
Trichloroethene (TCE)	79-01-6	0.47	0.47	21	mg/kg	<0.0005 U	<0.0005 U	<0.00054 U	<0.00051 U	<0.00049 U	<0.00086 U	<0.00053 U	<0.00062 U	<0.00055 U	<0.00066 U	<0.00064 U	<0.00069 U	<0.00071 U	<0.00072 U	<0.0005 U
Trichlorofluoromethane	75-69-4	NS	NS	NS	mg/kg	<0.004 U	<0.004 UJ	<0.0043 U	<0.0041 U	<0.0039 U	<0.0069 U	<0.0042 U	<0.0049 U	<0.0044 UJ	<0.0053 UJ	<0.0051 UJ	<0.0055 UJ	<0.0057 U	<0.0057 U	<0.004 U
Vinyl Acetate	108-05-4	NS	NS	NS	mg/kg	<0.01 U	<0.0099 U	<0.011 U	<0.01 U	<0.0099 U	<0.017 U	<0.01 U	<0.012 U	<0.011 U	<0.013 U	<0.013 U	<0.014 U	<0.014 U	<0.014 U	<0.01 U
Vinyl Chloride	75-01-4	0.02	0.02	0.9	mg/kg	<0.001 U	<0.00099 U	<0.0011 U	<0.001 U	<0.00099 U	<0.0017 U	<0.001 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0013 U	<0.0014 U	<0.0014 U	<0.0014 U	<0.001 U
Total VOCs	TOTAL VOCS	NS	NS	NS	mg/kg	0.02596	0.00729	0.00388	ND	0.0014	0.0276	0.0091	0.0092	0.0019	0.0119	0.0103	ND	ND	0.01524	ND

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB25	SB26	SB26	SB26	SB27	SB27	SB27	SB27	SB28	SB28	SB28	SB28	SB29	SB29	SB29
					Sample Name	SB25_0-2	SB26_0-2	SB26_3-5	SB26_5-7	SB27_0-2	SBDUP04_052523	SB27_3-5	SB27_6-8	SB28_0-2	SB28_2-4	SBDUP03_052523	SB28_6-8	SB29_0-2	SB29_3-5	SB29_5-7
					Sample Date	05/30/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/19/2023	05/19/2023	05/19/2023
					Sample Depth	0-2	0-2	3-5	5-7	0-2	0-2	3-5	6-8	0-2	2-4	2-4	6-8	0-2	3-5	5-7
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																				
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<0.13 U	<0.13 UJ	<0.026 UJ	<0.027 UJ	<0.12 UJ	<0.26 UJ	<0.026 UJ	<0.03 UJ	<0.13 UJ	<0.034 UJ	<0.03 U	<0.03 UJ	<0.13 U	<0.14 U	<0.026 U
2,4,5-Trichlorophenol	95-95-4	NS	NS	NS	mg/kg	<0.86 UJ	<0.85 UJ	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	mg/kg	<0.51 UJ	<0.51 UJ	<0.1 U	<0.11 U	<0.5 U	<1 U	<0.1 U	<0.12 U	<0.51 U	<0.13 U	<0.12 U	<0.12 U	<0.53 U	<0.57 U	<0.11 U
2,4-Dichlorophenol	120-83-2	NS	NS	NS	mg/kg	<0.77 UJ	<0.76 UJ	<0.16 U	<0.16 U	<0.75 U	<1.5 U	<0.16 U	<0.18 U	<0.77 U	<0.2 U	<0.18 U	<0.18 U	<0.8 U	<0.86 U	<0.16 U
2,4-Dimethylphenol	105-67-9	NS	NS	NS	mg/kg	<0.86 UJ	<0.85 UJ	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
2,4-Dinitrophenol	51-28-5	NS	NS	NS	mg/kg	<4.1 UJ	<4.1 UJ	<0.84 U	<0.88 U	<4 U	<8.2 U	<0.84 U	<0.96 U	<4.1 U	<1.1 U	<0.97 U	<0.97 U	<4.3 U	<4.6 U	<0.85 U
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
2,6-Dinitrotoluene	606-20-2	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
2-Chloronaphthalene	91-58-7	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
2-Chlorophenol	95-57-8	NS	NS	NS	mg/kg	<0.86 UJ	<0.85 UJ	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
2-Methylnaphthalene	91-57-6	NS	NS	NS	mg/kg	<1 U	<1 U	0.22	<0.22 U	<1 U	<2 U	0.03 J	<0.24 U	0.24 J	<0.27 U	0.098 J	<0.24 U	<1.1 U	<1.1 U	<0.21 U
2-Methylphenol (o-Cresol)	95-48-7	0.33	0.33	100	mg/kg	<0.86 UJ	<0.85 UJ	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
2-Nitroaniline	88-74-4	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
2-Nitrophenol	88-75-5	NS	NS	NS	mg/kg	<1.8 UJ	<1.8 UJ	<0.38 U	<0.39 U	<1.8 U	<3.7 U	<0.38 U	<0.43 U	<1.8 U	<0.48 U	<0.44 U	<0.44 U	<1.9 U	<2.1 U	<0.38 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	0.33	100	mg/kg	<1.2 UJ	<1.2 UJ	<0.25 U	<0.26 U	<1.2 U	<2.5 U	<0.25 U	<0.29 U	<1.2 U	<0.32 U	<0.29 U	<0.29 U	<1.3 U	<1.4 U	<0.26 U
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
3-Nitroaniline	99-09-2	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	NS	NS	mg/kg	<2.2 UJ	<2.2 UJ	<0.46 U	<0.47 U	<2.2 U	<4.4 U	<0.46 U	<0.52 U	<2.2 U	<0.58 U	<0.53 U	<0.53 U	<2.3 U	<2.5 U	<0.46 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
4-Chloro-3-Methylphenol	59-50-7	NS	NS	NS	mg/kg	<0.86 UJ	<0.85 UJ	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
4-Chloroaniline	106-47-8	NS	NS	NS	mg/kg	<0.86 UJ	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
4-Nitroaniline	100-01-6	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
4-Nitrophenol	100-02-7	NS	NS	NS	mg/kg	<1.2 UJ	<1.2 UJ	<0.25 U	<0.26 U	<1.2 U	<2.4 U	<0.25 U	<0.28 U	<1.2 U	<0.31 U	<0.28 U	<0.28 U	<1.2 U	<1.3 U	<0.25 U
Acenaphthene	83-32-9	20	98	100	mg/kg	<0.68 U	<0.68 U	0.22	<0.15 U	<0.67 U	<1.4 U	0.059 J	<0.16 U	0.74	0.04 J	0.17	<0.16 U	<0.71 U	<0.76 U	<0.14 U
Acenaphthylene	208-96-8	100	107	100	mg/kg	<0.68 U	<0.68 U	0.11 J	<0.15 U	<0.67 U	<1.4 U	0.035 J	<0.16 U	0.36 J	0.051 J	0.17	<0.16 U	<0.71 U	<0.76 U	<0.14 U
Acetophenone	98-86-2	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
Anthracene	120-12-7	100	1000	100	mg/kg	0.17 J	<0.51 U	0.44	<0.11 U	<0.5 U	<1 U	0.17	<0.12 U	1.3	0.1 J	0.39 J	<0.12 U	<0.53 U	<0.57 U	<0.11 U
Benzo(a)anthracene	56-55-3	**1**	1	1	mg/kg	0.45 J	<1 U	**1.1**	<0.11 U	<0.5 U	<1 U	0.53	<0.12 U	**3**	0.35 J	**1.1 J**	<0.12 U	0.5 J	0.5 J	<0.11 U
Benzo(a)pyrene	50-32-8	**1**	22	1	mg/kg	0.48 J	0.45 J	**1.2**	<0.15 U	0.56 J	<1.4 U	0.66	<0.16 U	**2.9**	0.43 J	**1.4 J**	<0.16 U	0.55 J	0.5 J	<0.14 U
Benzo(b)fluoranthene	205-99-2	**1**	1.7	1	mg/kg	0.62	0.48 J	**1.4**	<0.11 U	0.68	0.53 J	0.75	<0.12 U	**3.3**	0.49 J	**1.6 J**	<0.12 U	0.65	0.6	<0.11 U
Benzo(g,h,i)Perylene	191-24-2	100	1000	100	mg/kg	0.25 J	0.34 J	0.73	<0.15 U	0.32 J	0.36 J	0.4	<0.16 U	1.8	0.26 J	0.8 J	<0.16 U	0.33 J	0.3 J	<0.14 U
Benzo(k)fluoranthene	207-08-9	**0.8**	1.7	3.9	mg/kg	0.26 J	0.32 J	0.49	<0.11 U	0.19 J	<1 U	0.24	<0.12 U	**1.3**	0.16 J	0.51 J	<0.12 U	0.21 J	0.19 J	<0.11 U
Benzoic Acid	65-85-0	NS	NS	NS	mg/kg	<2.8 UJ	<2.8 UJ	<0.57 UJ	<0.59 UJ	<2.7 UJ	<5.6 UJ	<0.57 UJ	<0.65 UJ	<2.8 UJ	<0.73 UJ	<0.66 U	<0.66 UJ	<2.9 U	<3.1 U	<0.57 U
Benzyl Alcohol	100-51-6	NS	NS	NS	mg/kg	0.78 J	<0.85 UJ	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
Benzyl Butyl Phthalate	85-68-7	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
Biphenyl (Diphenyl)	92-52-4	NS	NS	NS	mg/kg	<2 U	<1.9 U	0.038 J	<0.42 U	<1.9 U	<3.9 U	<0.4 U	<0.46 U	<1.9 U	<0.51 U	0.032 J	<0.46 U	<2 U	<2.2 U	<0.4 U
Bis(2-chloroethoxy) methane	111-91-1	NS	NS	NS	mg/kg	<0.92 U	<0.92 U	<0.19 U	<0.2 U	<0.9 U	<1.8 U	<0.19 U	<0.22 U	<0.92 U	<0.24 U	<0.22 U	<0.22 U	<0.96 U	<1 U	<0.19 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	NS	NS	mg/kg	<0.77 U	<0.76 U	<0.16 U	<0.16 U	<0.75 U	<1.5 U	<0.16 U	<0.18 U	<0.77 U	<0.2 U	<0.18 U	<0.18 U	<0.8 U	<0.86 U	<0.16 U
Bis(2-chloroisopropyl) ether	108-60-1	NS	NS	NS	mg/kg	<1 U	<1 UJ	<0.21 UJ	<0.22 UJ	<1 UJ	<2 UJ	<0.21 UJ	<0.24 UJ	<1 UJ	<0.27 UJ	<0.24 U	<0.24 UJ	<1.1 U	<1.1 U	<0.21 U
Bis(2-ethylhexyl) phthalate	117-81-7	NS	NS	NS	mg/kg	0.35 J	<0.85 U	0.093 J	0.068 J	<0.84 U	<1.7 U	0.3	<0.2 U	<0.85 U	<0.22 U	<0.2 U	0.072 J	0.32 J	<0.96 U	<0.18 U
Carbazole	86-74-8	NS	NS	NS	mg/kg	0.094 J	<0.85 U	0.15 J	<0.18 U	<0.84 U	<1.7 U	0.054 J	<0.2 U	0.81 J	0.068 J	0.27	<0.2 U	<0.89 U	<0.96 U	<0.18 U
Chrysene	218-01-9	**1**	1	3.9	mg/kg	0.51	0.52 J	**1.1**	<0.11 U	0.46 J	0.45 J	0.54	<0.12 U	**3.4**	0.37 J	**1.2 J**	<0.12 U	0.48 J	0.49 J	<0.11 U
Dibenz(a,h)anthracene	53-70-3	**0.33**	1000	0.33	mg/kg	<0.51 U	<0.51 U	0.18	<0.11 U	<0.5 U	<1 U	0.084 J	<0.12 U	**0.4 J**	0.058 J	0.18	<0.12 U	<0.53 U	<0.57 U	<0.11 U
Dibenzofuran	132-64-9	7	210	59	mg/kg	<0.86 U	<0.85 U	0.1 J	<0.18 U	<0.84 U	<1.7 U	0.034 J	<0.2 U	0.56 J	0.037 J	0.19 J	<0.2 U	<0.89 U	<0.96 U	<0.18 U
Dibutyl phthalate	84-74-2	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
Diethyl phthalate	84-66-2	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
Dimethyl phthalate	131-11-3	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
Dioctyl phthalate	117-84-0	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
Fluoranthene	206-44-0	**100**	1000	100	mg/kg	1.1	0.97	2.4	<0.11 U	0.83	<1 U	1.1	<0.12 U	9.2	0.94 J	3.2 J	<0.12 U	1	0.94	<0.11 U
Fluorene	86-73-7	30	386	100	mg/kg	<0.86 U	<0.85 U	0.21	<0.18 U	<0.84 U	<1.7 U	0.064 J	<0.2 U	0.62 J	0.04 J	0.17 J	<0.2 U	<0.89 U	<0.96 U	<0.18 U
Hexachlorobenzene	118-74-1	0.33	3.2	1.2	mg/kg	<0.51 U	<0.51 U	<0.1 U	<0.11 U	<0.5 U	<1 U	<0.1 U	<0.12 U	<0.51 U	<0.13 U	<0.12 U	<0.12 U	<0.53 U	<0.57 U	<0.11 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	mg/kg	<2.4 UJ	<2.4 U	<0.5 U	<0.52 U	<2.4 U	<4.9 U	<0.5 U	<0.57 U	<2.4 U	<0.64 U	<0.58 U	<0.58 U	<2.5 UJ	<2.7 UJ	<0.51 UJ
Hexachloroethane	67-72-1	NS	NS	NS	mg/kg	<0.68 U	<0.68 U	<0.14 U	<0.15 U	<0.67 U	<1.4 U	<0.14 U	<0.16 U	<0.68 U	<0.18 U	<0.16 U	<0.16 U	<0.71 U	<0.76 U	<0.14 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	8.2	0.5	mg/kg	0.28 J	0.27 J	**0.85**	<0.15 U	0.34 J	0.3 J	0.45	<0.16 U	**2**	0.31 J	**0.98 J**	<0.16 U	0.35 J	0.34 J	<0.14 U
Isophorone	78-59-1	NS	NS	NS	mg/kg	<0.77 U	<0.76 U	<0.16 U	<0.16 U	<0.75 U	<1.5 U	<0.16 U	<0.18 U	<0.77 U	<0.2 U	<0.18 U	<0.18 U	<0.8 U	<0.86 U	<0.16 U
Naphthalene	91-20-3	**12**	12	100	mg/kg	<0.86 U	<0.85 U	0.24	<0.18 U	<0.84 U	<1.7 U	0.026 J	<0.2 U	0.39 J	0.042 J	0.25	<0.2 U	<0.89 U	<0.96 U	<0.18 U
Nitrobenzene	98-95-3	NS	NS	NS	mg/kg	<0.77 U	<0.76 U	<0.16 U	<0.16 U	<0.75 U	<1.5 U	<0.16 U	<0.18 U	<0.77 U	<0.2 U	<0.18 U	<0.18 U	<0.8 U	<0.86 U	<0.16 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	NS	NS	mg/kg	<0.86 U	<0.85 U	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
n-Nitrosodiphenylamine	86-30-6	NS	NS	NS	mg/kg	<0.68 U	<0.68 U	<0.14 U	<0.15 U	<0.67 U	<1.4 U	<0.14 U	<0.16 U	<0.68 U	<0.18 U	<0.16 U	<0.16 U	<0.71 U	<0.76 U	<0.14 U
Pentachlorophenol	87-86-5	0.8	0.8	6.7	mg/kg	<0.68 UJ	<0.68 UJ	<0.14 U	<0.15 U	<0.67 U	<1.4 U	<0.14 U	<0.16 U	<0.68 U	<0.18 U	<0.16 U	<0.16 U	<0.71 U	<0.76 U	<0.14 U
Phenanthrene	85-01-8	100	1000	100	mg/kg	0.85	0.46 J	2.1	<0.11 U	0.44 J	0.43 J	0.88	0.041 J	7.3	0.61 J	2.5 J	<0.12 U	0.66	0.68	<0.11 U
Phenol	108-95-2	0.33	0.33	100	mg/kg	<0.86 UJ	<0.85 UJ	<0.18 U	<0.18 U	<0.84 U	<1.7 U	<0.18 U	<0.2 U	<0.85 U	<0.22 U	<0.2 U	<0.2 U	<0.89 U	<0.96 U	<0.18 U
Pyrene	129-00-0	**100**	1000	100	mg/kg	0.98	0.82	2.3	<0.11 U	0.81	0.71 J	1.1	0.032 J	8.2	0.81 J	2.8 J	<0.12 U	0.89	0.78	<0.11 U

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB25	SB26	SB26	SB26	SB27	SB27	SB27	SB27	SB28	SB28	SB28	SB28	SB29	SB29	SB29
					Sample Name	SB25_0-2	SB26_0-2	SB26_3-5	SB26_5-7	SB27_0-2	SBDUP04_052523	SB27_3-5	SB27_6-8	SB28_0-2	SB28_2-4	SBDUP03_052523	SB28_6-8	SB29_0-2	SB29_3-5	SB29_5-7
					Sample Date	05/30/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/19/2023	05/19/2023	05/19/2023
					Sample Depth	0-2	0-2	3-5	5-7	0-2	0-2	3-5	6-8	0-2	2-4	2-4	6-8	0-2	3-5	5-7
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																				
4,4'-DDD	72-54-8	**0.0033**	14	13	mg/kg	0.00131 J	0.00168	0.002	<0.0018 U	0.00276	**0.00451**	**0.00403**	0.00117 J	0.00172 J	<0.00217 U	<0.00186 U	<0.00192 U	0.000745 J	<0.00179 U	<0.00168 U
4,4'-DDE	72-55-9	**0.0033**	17	8.9	mg/kg	**0.00915**	0.0012 J	**0.00525**	<0.0018 U	**0.00471**	**0.00671**	0.00235	<0.00189 U	**0.00579**	<0.00217 U	<0.00186 U	<0.00192 U	0.000726 J	<0.00179 U	<0.00168 U
4,4'-DDT	50-29-3	**0.0033**	136	7.9	mg/kg	<0.00162 U	**0.00395**	**0.0197**	<0.0018 U	**0.0178**	**0.0221**	**0.00696**	<0.00189 U	**0.00412**	<0.00217 U	<0.00186 U	<0.00192 U	<0.00162 U	<0.00179 U	<0.00168 U
Aldrin	309-00-2	**0.005**	0.19	0.097	mg/kg	0.00392	<0.00158 U	0.00115 J	<0.0018 U	<0.00159 U	<0.00163 U	<0.00162 U	<0.00189 U	0.00141 J	<0.00217 U	<0.00186 U	<0.00192 U	<0.00162 U	<0.00179 U	<0.00168 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	0.02	0.48	mg/kg	<0.000676 U	<0.000656 U	<0.000698 U	<0.000751 U	<0.000664 U	<0.00068 U	<0.000674 U	<0.000786 U	<0.00067 U	<0.000905 U	<0.000775 U	<0.000801 U	<0.000674 U	<0.000745 U	<0.000699 U
Alpha Chlordane	5103-71-9	**0.094**	2.9	4.2	mg/kg	0.0308	0.002	0.0109 J	<0.00225 U	0.00365	0.00294 J	0.00229	<0.00236 U	0.00449	<0.00272 U	<0.00232 U	<0.0024 U	0.00429 J	0.000804 J	<0.0021 U
Alpha Endosulfan	959-98-8	2.4	102	24	mg/kg	<0.00162 U	<0.00158 U	<0.00168 U	<0.0018 U	<0.00159 U	<0.00163 U	<0.00162 U	<0.00189 U	<0.00161 U	<0.00217 U	<0.00186 U	<0.00192 U	<0.00162 U	<0.00179 U	<0.00168 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	0.09	0.36	mg/kg	<0.00162 U	<0.00158 U	<0.00168 U	<0.0018 U	<0.00159 U	<0.00163 U	<0.00162 U	<0.00189 U	<0.00161 U	<0.00217 U	<0.00186 U	<0.00192 U	<0.00162 U	<0.00179 U	<0.00168 U
Beta Endosulfan	33213-65-9	2.4	102	24	mg/kg	<0.00162 U	<0.00158 U	<0.00168 U	<0.0018 U	<0.00159 U	<0.00163 U	<0.00162 U	<0.00189 U	<0.00161 U	<0.00217 U	<0.00186 U	<0.00192 U	<0.00162 U	<0.00179 U	<0.00168 U
Chlordane (alpha and gamma)	57-74-9	NS	NS	NS	mg/kg	0.254	0.0184	0.106	<0.015 U	0.017	<0.0136 U	<0.0135 U	<0.0157 U	0.0413	<0.0181 U	<0.0155 U	<0.016 U	0.0386	<0.0149 U	<0.014 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	0.25	100	mg/kg	<0.00162 U	<0.00158 U	<0.00168 U	<0.0018 U	<0.00159 U	<0.00163 U	<0.00162 U	<0.00189 U	<0.00161 U	<0.00217 U	<0.00186 U	<0.00192 U	<0.00162 U	<0.00179 U	<0.00168 U
Dieldrin	60-57-1	**0.005**	0.1	0.2	mg/kg	**0.00928**	0.000572 J	**0.0059**	<0.00113 U	<0.000996 U	<0.00102 U	<0.00101 U	<0.00118 U	0.00202	<0.00136 U	<0.00116 U	<0.0012 U	<0.00101 U	<0.00112 U	<0.00105 U
Endosulfan Sulfate	1031-07-8	2.4	1000	24	mg/kg	<0.000676 U	<0.000656 U	<0.000698 U	<0.000751 U	<0.000664 U	<0.00068 U	<0.000674 U	<0.000786 U	<0.00067 U	<0.000905 U	<0.000775 U	<0.000801 U	<0.000674 U	<0.000745 U	<0.000699 U
Endrin	72-20-8	0.014	0.06	11	mg/kg	<0.000676 U	<0.000656 U	<0.000698 U	<0.000751 U	<0.000664 U	<0.00068 U	<0.000674 U	<0.000786 U	<0.00067 U	<0.000905 U	<0.000775 U	<0.000801 U	<0.000674 U	<0.000745 U	<0.000699 U
Endrin Aldehyde	7421-93-4	NS	NS	NS	mg/kg	<0.00203 U	<0.00197 U	<0.00209 U	<0.00225 U	<0.00199 U	<0.00204 U	<0.00202 U	<0.00236 U	<0.00201 U	<0.00272 U	<0.00232 U	<0.0024 U	<0.00202 U	<0.00223 U	<0.0021 U
Endrin Ketone	53494-70-5	NS	NS	NS	mg/kg	<0.00162 U	<0.00158 U	<0.00168 U	<0.0018 U	<0.00159 U	<0.00163 U	<0.00162 U	<0.00189 U	<0.00161 U	<0.00217 U	<0.00186 U	<0.00192 U	<0.00162 U	<0.00179 U	<0.00168 U
Gamma Bhc (Lindane)	58-89-9	0.1	0.1	1.3	mg/kg	<0.000676 U	<0.000656 U	<0.000698 U	<0.000751 U	<0.000664 U	<0.00068 U	<0.000674 U	<0.000786 U	<0.00067 U	<0.000905 U	<0.000775 U	<0.000801 U	<0.000674 U	<0.000745 U	<0.000699 U
Gamma Chlordane (Trans)	5103-74-2	NS	NS	NS	mg/kg	0.028	0.00217	0.0139	<0.00225 U	0.00203 J	0.00392	0.00166 J	<0.00236 U	0.00482	<0.00272 U	<0.00232 U	<0.0024 U	0.00579	0.000637 J	<0.0021 U
Heptachlor	76-44-8	0.042	0.38	2.1	mg/kg	0.00252	<0.000788 U	0.00153	<0.000902 U	<0.000797 U	<0.000816 U	<0.000809 U	<0.000944 U	<0.000805 U	<0.00109 U	<0.00093 U	<0.000961 U	<0.000808 U	<0.000894 U	<0.000839 U
Heptachlor Epoxide	1024-57-3	NS	NS	NS	mg/kg	0.00156 J	<0.00295 U	0.00284 J	<0.00338 U	<0.00299 U	<0.00306 U	<0.00303 U	<0.00354 U	<0.00302 U	<0.00407 U	<0.00349 U	<0.0036 U	<0.00303 U	<0.00335 U	<0.00315 U
Methoxychlor	72-43-5	NS	NS	NS	mg/kg	<0.00304 U	<0.00295 U	<0.00314 U	<0.00338 U	<0.00299 U	<0.00306 U	<0.00303 U	<0.00354 U	<0.00302 U	<0.00407 U	<0.00349 U	<0.0036 U	<0.00303 U	<0.00335 U	<0.00315 U
Toxaphene	8001-35-2	NS	NS	NS	mg/kg	<0.0304 U	<0.0295 U	<0.0314 U	<0.0338 U	<0.0299 U	<0.0306 U	<0.0303 U	<0.0354 U	<0.0302 U	<0.0407 U	<0.0349 U	<0.036 U	<0.0303 U	<0.0335 U	<0.0315 U
Herbicides																				
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	NS	NS	mg/kg	<0.17 U	<0.17 U	<0.174 U	<0.184 U	<0.167 U	<0.172 U	<0.175 U	<0.2 U	<0.173 U	<0.221 U	<0.203 U	<0.201 U	<0.174 U	<0.191 U	<0.176 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	NS	NS	mg/kg	<0.17 U	<0.17 U	<0.174 U	<0.184 U	<0.167 U	<0.172 U	<0.175 U	<0.2 U	<0.173 U	<0.221 U	<0.203 U	<0.201 U	<0.174 U	<0.191 U	<0.176 U
Silvex (2,4,5-Tp)	93-72-1	3.8	3.8	100	mg/kg	<0.17 U	<0.17 U	<0.174 U	<0.184 U	<0.167 U	<0.172 U	<0.175 U	<0.2 U	<0.173 U	<0.221 U	<0.203 U	<0.201 U	<0.174 U	<0.191 U	<0.176 U
Polychlorinated Biphenyl																				
PCB-1016 (Aroclor 1016)	12674-11-2	NS	NS	NS	mg/kg	<0.0515 U	<0.0491 U	<0.0499 U	<0.0543 U	<0.0503 U	<0.0509 U	<0.0503 U	<0.0578 U	<0.0509 U	<0.0632 U	<0.0599 U	<0.0567 U	<0.0493 U	<0.0538 U	<0.0508 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	NS	NS	mg/kg	<0.0515 U	<0.0491 U	<0.0499 U	<0.0543 U	<0.0503 U	<0.0509 U	<0.0503 U	<0.0578 U	<0.0509 U	<0.0632 U	<0.0599 U	<0.0567 U	<0.0493 U	<0.0538 U	<0.0508 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	NS	NS	mg/kg	<0.0515 U	<0.0491 U	<0.0499 U	<0.0543 U	<0.0503 U	<0.0509 U	<0.0503 U	<0.0578 U	<0.0509 U	<0.0632 U	<0.0599 U	<0.0567 U	<0.0493 U	<0.0538 U	<0.0508 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	NS	NS	mg/kg	<0.0515 U	<0.0491 U	<0.0499 U	<0.0543 U	<0.0503 U	<0.0509 U	<0.0503 U	<0.0578 U	<0.0509 U	<0.0632 U	<0.0599 U	<0.0567 U	<0.0493 U	<0.0538 U	<0.0508 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	NS	NS	mg/kg	<0.0515 U	<0.0491 U	<0.0499 U	<0.0543 U	<0.0503 U	<0.0509 U	<0.0503 U	<0.0578 U	<0.0509 U	<0.0632 U	<0.0599 U	<0.0567 U	<0.0493 U	<0.0538 U	<0.0508 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	NS	NS	mg/kg	0.0283 J	<0.0491 U	<0.0499 U	<0.0543 U	<0.0503 U	<0.0509 U	<0.0503 U	<0.0578 U	<0.0509 U	<0.0632 U	<0.0599 U	<0.0567 U	<0.0493 U	<0.0538 U	<0.0508 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	NS	NS	mg/kg	<0.0515 U	<0.0491 U	0.0159 J	<0.0543 U	0.0196 J	0.0176 J	<0.0503 U	<0.0578 U	<0.0509 U	<0.0632 U	<0.0599 U	<0.0567 U	<0.0493 U	<0.0538 U	<0.0508 U
PCB-1262 (Aroclor 1262)	37324-23-5	NS	NS	NS	mg/kg	<0.0515 U	<0.0491 U	<0.0499 U	<0.0543 U	<0.0503 U	<0.0509 U	<0.0503 U	<0.0578 U	<0.0509 U	<0.0632 U	<0.0599 U	<0.0567 U	<0.0493 U	<0.0538 U	<0.0508 U
PCB-1268 (Aroclor 1268)	11100-14-4	NS	NS	NS	mg/kg	<0.0515 U	<0.0491 U	0.0058 J	<0.0543 U	<0.0503 U	0.00708 J	0.00604 J	<0.0578 U	<0.0509 U	<0.0632 U	<0.0599 U	<0.0567 U	<0.0493 U	<0.0538 U	<0.0508 U
Total PCBs	1336-36-3	0.1	3.2	1	mg/kg	0.0283 J	<0.0491 U	0.0217 J	<0.0543 U	0.0196 J	0.0247 J	0.00604 J	<0.0578 U	<0.0509 U	<0.0632 U	<0.0599 U	<0.0567 U	<0.0493 U	<0.0538 U	<0.0508 U
Metals																				
Aluminum	7429-90-5	NS	NS	NS	mg/kg	6,000	3,940	4,660	389	2,800	3,010	1,600	550	2,490	612	759	919	3,330	1,380	332
Antimony	7440-36-0	NS	NS	NS	mg/kg	0.495 J	<3.96 U	<4.06 U	<4.29 U	<3.98 U	<4.05 U	<4.02 U	<4.58 U	<4.1 U	<5.28 U	<4.7 U	<4.78 U	1.22 J	0.467 J	<4.15 U
Arsenic	7440-38-2	13	16	16	mg/kg	2.95	2.02	3.52	0.294 J	2.29	2.99	1.26	0.585 J	2.33	0.877 J	0.853 J	0.737 J	2.79	1.75	0.527 J
Barium	7440-39-3	**350**	820	400	mg/kg	70.3	52.4	102	3.47	53.1 J	145 J	55.8	4.66	64.2	14 J	7.71 J	3.23	60.8	29.1	1.31
Beryllium	7440-41-7	7.2	47	72	mg/kg	0.31 J	0.184 J	0.272 J	0.035 J	0.174 J	0.178 J	0.116 J	0.058 J	0.171 J	0.056 J	0.065 J	0.066 J	0.234 J	0.157 J	0.054 J
Cadmium	7440-43-9	2.5	7.5	4.3	mg/kg	0.125 J	0.113 J	0.217 J	<0.857 U	0.103 J	0.134 J	0.131 J	<0.916 U	0.203 J	<1.06 U	<0.939 U	<0.957 U	0.344 J	0.098 J	<0.831 U
Calcium	7440-70-2	NS	NS	NS	mg/kg	30,300	20,000	18,200	280	54,300	43,200	19,800	557	14,700	645	504	391	46,600	8,940	253
Chromium, Hexavalent	18540-29-9	**1**	19	110	mg/kg	0.407 J	**1.04 J**	0.533 J	<0.904 UJ	0.635 J	<0.829 UJ	0.374 J	<0.964 UJ	<0.846 U	<1.09 UJ	<0.99 UJ	<0.977 UJ	<0.854 U	0.265 J	0.182 J
Chromium, Total	7440-47-3	NS	NS	NS	mg/kg	35.5	11.6	16.1	2.3	7.07	11.2	7.41	4.55	9.4	4.18	3.61	6.82	8.86	9.14	2.75
Chromium, Trivalent	16065-83-1	**30**	NS	180	mg/kg	**35.1 J**	10.6	15.6 J	2.3	6.44 J	11.2 J	7.04 J	4.55	9.04 J	4.18	3.61	6.82	8.86	8.88 J	2.57 J
Cobalt	7440-48-4	NS	NS	NS	mg/kg	5.39	2.79	3.48	0.246 J	3.32	3.56	1.37 J	0.361 J	2.41	0.413 J	0.573 J	0.637 J	4.68	1.92	0.283 J
Copper	7440-50-8	**50**	1720	270	mg/kg	25.2	12.5	22.2	0.538 J	38.3	31.2	8.76	1.16	19.5	2.02	1.19	1.08	32.9	8.2	0.262 J
Cyanide	57-12-5	27	40	27	mg/kg	<1 U	<1 UJ	<1 UJ	<1.1 UJ	<0.95 UJ	<1 UJ	<1 UJ	<1.2 UJ	<0.97 UJ	<1.4 UJ	<1.2 UJ	<1.1 UJ	<1 U	<1.1 U	<1 U
Iron	7439-89-6	NS	NS	NS	mg/kg	11,000	6,960	8,910	821	8,950	8,670	3,670	1,580	7,330	1,660	1,910	2,260	9,520	4,850	1,020
Lead	7439-92-1	**63**	450	400	mg/kg	27	47.5	**154**	2.46 J	**85.3 J**	**260 J**	**99.7**	3.63 J	**107**	19.9 J	9.34 J	1.75 J	**89.9 J**	34.2	1.41 J
Magnesium	7439-95-4	NS	NS	NS	mg/kg	6,600	3,350	3,510	167	27,900	21,000	8,640	280	3,310	296	392	414	25,000	4,870	148
Manganese	7439-96-5	1600	2000	2000	mg/kg	178	112	131	10.1	120	105	84.1	19.4	101	22.4	17.5	19.3	143	63.1	15.3
Mercury	7439-97-6	**0.18**	0.73	0.81	mg/kg	<0.077 U	0.05 J	0.172	<0.071 U	0.094	0.06 J	<0.069 U	<0.076 U	0.17	<0.086 U	<0.078 U	<0.078 U	0.066 J	0.129	<0.075 U
Nickel	7440-02-0	30	130	310	mg/kg	19.6	6.79	11.7	1.02 J	7.43	7.58	5.45	1.21 J	6.21	1.45 J	2.32 J	3.47	10.4	4.52	0.855 J
Potassium	7440-09-7	NS	NS	NS	mg/kg	2,180	1,040	932	<214 U	400	714	209	<229 U	511	<264 U	<235 U	<239 U	613 J	224 J	63 J
Selenium	7782-49-2	3.9	4	180	mg/kg	<1.58 U	<1.58 U	<1.63 U	<1.71 U	<1.59 U	<1.62 U	<1.61 U	<1.83 U	<1.64 U	<2.11 U	<1.88 U	<1.91 U	<1.66 U	<1.82 U	<1.66 U
Silver	7440-22-4	2	8.3	180	mg/kg	<0.396 U	<0.396 U	<0.406 U	<0.429 U	<0.398 U	<0.405 U	<0.402 U	<0.458 U	<0.41 U	<0.528 U	<0.47 U	<0.478 U	<0.416 U	<0.455 U	<0.415 U
Sodium	7440-23-5	NS	NS	NS	mg/kg	286	168	197	<171 U	181	187	<161 U	<183 U	305	<211 U	<188 U	<191 U	222	74.2 J	18.6 J
Thallium	7440-28-0	NS	NS	NS	mg/kg	0.383 J	0.381 J	0.333 J	<1.71 U	0.307 J	0.325 J	<1.61 U	<1.83 U	0.32 J	<2.11 U	<1.88 U	<1.91 U	<1.66 U	<1.82 U	<1.66 U
Vanadium	7440-62-2	NS	NS	NS	mg/kg	24.2	13.8	17.1	1.98	32.3	31.3	9.44	3.83	15.5	3.97	3.56	4.86	21.2	13.5	2.81
Zinc	7440-66-6	**109**	2480	10000	mg/kg	40.9	44.3	**158**	20.5	51.4 J	87.2 J	88.2	25.8	**111**	57.9	49.2	28.5	75.8 J	33.6	4.02 J
General Chemistry																				
Total Solids	TSOLID	NS	NS	NS	Percent	95.8	96.3	93.8	88.5	97.6	96.5	93.6	83	94.5	73.3	80.8	81.9	93.7	86.9	93.4

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB25	SB26	SB26	SB26	SB27	SB27	SB27	SB27	SB28	SB28	SB28	SB28	SB29	SB29	SB29
					Sample Name	SB25_0-2	SB26_0-2	SB26_3-5	SB26_5-7	SB27_0-2	SBDUP04_052523	SB27_3-5	SB27_6-8	SB28_0-2	SB28_2-4	SBDUP03_052523	SB28_6-8	SB29_0-2	SB29_3-5	SB29_5-7
					Sample Date	05/30/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/25/2023	05/19/2023	05/19/2023	05/19/2023
					Sample Depth	0-2	0-2	3-5	5-7	0-2	0-2	3-5	6-8	0-2	2-4	2-4	6-8	0-2	3-5	5-7
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances																				
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	763051-92-9	NS	NS	NS	mg/kg	<0.000791 U	<0.000778 U	<0.000796 U	<0.000794 U	<0.000787 U	<0.000796 U	<0.000796 U	<0.000794 U	<0.000794 U	<0.000795 U	<0.000788 U	<0.000798 U	<0.000788 U	<0.000798 U	<0.000796 U
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2FTS)	39108-34-4	NS	NS	NS	mg/kg	<0.000791 U	<0.000778 U	<0.000796 U	<0.000794 U	<0.000787 UJ	<0.000796 UJ	<0.000796 U	<0.000794 U	<0.000794 U	<0.000795 U	<0.000788 U	<0.000798 U	<0.000788 UJ	<0.000798 U	<0.000796 U
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	NS	NS	mg/kg	<0.000791 U	<0.000778 U	<0.000796 U	<0.000794 U	<0.000787 U	<0.000796 U	<0.000796 U	<0.000794 U	<0.000794 U	<0.000795 U	<0.000788 U	<0.000798 U	<0.000788 U	<0.000798 U	<0.000796 U
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2FTS)	27619-97-2	NS	NS	NS	mg/kg	<0.000791 U	<0.000778 U	<0.000796 U	<0.000794 U	<0.000787 U	<0.000796 U	<0.000796 U	<0.000794 U	<0.000794 U	<0.000795 U	<0.000788 U	<0.000798 U	<0.000788 U	<0.000798 U	<0.000796 U
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3FTCA)	914637-49-3	NS	NS	NS	mg/kg	<0.00494 U	<0.00486 U	<0.00497 U	<0.00496 U	<0.00492 U	<0.00497 U	<0.00497 U	<0.00496 U	<0.00496 U	<0.00497 U	<0.00493 U	<0.00499 U	<0.00492 U	<0.00498 U	<0.00498 U
3-Perfluoroheptyl Propanoic Acid (7:3FTCA)	812-70-4	NS	NS	NS	mg/kg	<0.00494 U	<0.00486 U	<0.00497 U	<0.00496 U	<0.00492 U	<0.00497 U	<0.00497 U	<0.00496 U	<0.00496 U	<0.00497 U	<0.00493 U	<0.00499 U	<0.00492 U	<0.00498 U	<0.00498 U
3-Perfluoropropyl Propanoic Acid (3:3FTCA)	356-02-5	NS	NS	NS	mg/kg	<0.000988 U	<0.000972 U	<0.000994 U	<0.000993 U	<0.000983 U	<0.000994 U	<0.000995 U	<0.000992 U	<0.000993 U	<0.000994 U	<0.000985 U	<0.000998 U	<0.000984 U	<0.000997 U	<0.000995 U
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	NS	NS	NS	mg/kg	<0.000791 U	<0.000778 U	<0.000796 U	<0.000794 U	<0.000787 U	<0.000796 U	<0.000796 U	<0.000794 U	<0.000794 U	<0.000795 U	<0.000788 U	<0.000798 U	<0.000788 U	<0.000798 U	<0.000796 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid	756426-58-1	NS	NS	NS	mg/kg	<0.000791 U	<0.000778 U	<0.000796 U	<0.000794 U	<0.000787 U	<0.000796 U	<0.000796 U	<0.000794 U	<0.000794 U	<0.000795 U	<0.000788 U	<0.000798 U	<0.000788 U	<0.000798 U	<0.000796 U
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	NS	NS	mg/kg	<0.000791 U	<0.000778 U	<0.000796 U	<0.000794 U	<0.000787 U	<0.000796 U	<0.000796 U	<0.000794 U	<0.000794 U	<0.000795 U	<0.000788 U	<0.000798 U	<0.000788 U	<0.000798 U	<0.000796 U
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	NS	NS	mg/kg	<0.00198 U	<0.00194 U	<0.00199 U	<0.00198 U	<0.00197 U	<0.00199 U	<0.00199 U	<0.00198 U	<0.00198 U	<0.00199 U	<0.00197 U	<0.002 U	<0.00197 U	<0.00199 U	<0.00199 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA	2355-31-9	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	NS	NS	mg/kg	<0.00198 U	<0.00194 U	<0.00199 U	<0.00198 U	<0.00197 U	<0.00199 U	<0.00199 U	<0.00198 U	<0.00198 U	<0.00199 U	<0.00197 U	<0.002 U	<0.00197 U	<0.00199 U	<0.00199 U
Nonafluoro-3,6-dioxaheptanoic acid	151772-58-6	NS	NS	NS	mg/kg	<0.000395 U	<0.000389 U	<0.000398 U	<0.000397 U	<0.000393 U	<0.000398 U	<0.000398 U	<0.000397 U	<0.000397 U	<0.000398 U	<0.000394 U	<0.000399 U	<0.000394 U	<0.000399 U	<0.000398 U
Perfluoro(2-ethoxyethane)sulfonic acid	113507-82-7	NS	NS	NS	mg/kg	<0.000395 U	<0.000389 U	<0.000398 U	<0.000397 U	<0.000393 U	<0.000398 U	<0.000398 U	<0.000397 U	<0.000397 U	<0.000398 U	<0.000394 U	<0.000399 U	<0.000394 U	<0.000399 U	<0.000398 U
Perfluoro-3-methoxypropanoic acid	377-73-1	NS	NS	NS	mg/kg	<0.000395 U	<0.000389 U	<0.000398 U	<0.000397 U	<0.000393 U	<0.000398 U	<0.000398 U	<0.000397 U	<0.000397 U	<0.000398 U	<0.000394 U	<0.000399 U	<0.000394 U	<0.000399 U	<0.000398 U
Perfluoro-4-methoxybutanoic acid	863090-89-5	NS	NS	NS	mg/kg	<0.000395 U	<0.000389 U	<0.000398 U	<0.000397 U	<0.000393 U	<0.000398 U	<0.000398 U	<0.000397 U	<0.000397 U	<0.000398 U	<0.000394 U	<0.000399 U	<0.000394 U	<0.000399 U	<0.000398 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	NS	NS	mg/kg	0.000206	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
Perfluorobutanoic acid (PFBA)	375-22-4	NS	NS	NS	mg/kg	<0.000791 U	<0.000778 U	<0.000796 U	<0.000794 U	<0.000787 U	<0.000796 U	<0.000796 U	<0.000794 U	<0.000794 U	<0.000795 U	<0.000788 U	<0.000798 U	<0.000788 U	<0.000798 U	<0.000796 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	NS	NS	mg/kg	0.000032 J	<0.000194 U	0.000064 J	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	0.000024 J	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	NS	NS	mg/kg	0.000095 J	<0.000194 U	0.000103 J	<0.000198 U	<0.000197 U	0.000056 J	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	0.001	0.044	mg/kg	0.000237	0.000607	**0.000899**	0.00062	0.000315	0.000318	0.000573	0.000421	**0.00136**	**0.0016**	**0.00165**	0.000455	0.000796	**0.00155**	0.00082
Perfluorooctanoic Acid (PFOA)	335-67-1	0.00066	0.0008	0.033	mg/kg	0.000095 J	<0.000194 U	0.000119 J	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	0.000056 J	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	0.000191 J	<0.000199 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	NS	NS	mg/kg	0.000055 J	<0.000389 U	0.000127 J	<0.000397 U	<0.000393 U	<0.000398 U	<0.000398 U	<0.000397 U	<0.000397 U	<0.000398 U	<0.000394 U	<0.000399 U	<0.000394 U	<0.000399 U	<0.000398 U
Perfluoropentansulfonic Acid (PFPeS)	2706-91-4	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	NS	NS	mg/kg	<0.000198 U	<0.000194 U	<0.000199 U	<0.000198 U	<0.000197 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000197 U	<0.0002 U	<0.000197 U	<0.000199 U	<0.000199 U

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB30	SB30	SB30	SB31	SB31	SB31	SB32	SB32	SB32	SB33	SB33	SB33	SB33
					Sample Name	SB30_0-2	SB30_2-4	SB30_6-8	SB31_0-2	SB31_3-5	SB31_5-7	SB32_0-2	SB32_4-6	SB32_6-8	SB33_0-2	SBDUP01_051923	SB33_4-6	SB33_6-8
					Sample Date	05/25/2023	05/25/2023	05/25/2023	05/18/2023	05/18/2023	05/18/2023	05/19/2023	05/19/2023	05/19/2023	05/19/2023	05/19/2023	05/19/2023	05/19/2023
					Sample Depth	0-2	2-4	6-8	0-2	3-5	5-7	0-2	4-6	6-8	0-2	0-2	4-6	6-8
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																		
1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	NS	mg/kg	<0.00078 U	<0.00053 U	<0.00063 U	<0.00075 U	<0.00054 U	<0.00053 U	<0.00062 U	<0.0009 U	<0.00063 U	<0.00048 U	<0.00052 U	<0.00049 U	<0.00058 U
1,1,1-Trichloroethane	71-55-6	0.68	0.68	100	mg/kg	<0.00078 U	<0.00053 U	<0.00063 U	<0.00075 U	<0.00054 U	<0.00053 U	<0.00062 U	<0.0009 U	<0.00063 U	<0.00048 U	<0.00052 U	<0.00049 U	<0.00058 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	mg/kg	<0.00078 U	<0.00053 U	<0.00063 U	<0.00075 U	<0.00054 U	<0.00053 U	<0.00062 U	<0.0009 U	<0.00063 U	<0.00048 U	<0.00052 U	<0.00049 U	<0.00058 U
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	<0.00098 U	<0.0012 U
1,1-Dichloroethane	75-34-3	0.27	0.27	26	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	<0.00098 U	<0.0012 U
1,1-Dichloroethene	75-35-4	0.33	0.33	100	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	<0.00098 U	<0.0012 U
1,1-Dichloropropene	563-58-6	NS	NS	NS	mg/kg	<0.00078 U	<0.00053 U	<0.00063 U	<0.00075 U	<0.00054 U	<0.00053 U	<0.00062 U	<0.0009 U	<0.00063 U	<0.00048 U	<0.00052 U	<0.00049 U	<0.00058 U
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
1,2,3-Trichloropropane	96-18-4	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
1,2,4,5-Tetramethylbenzene	95-93-2	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	0.0015 J	<0.0021 U	0.00026 J	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
1,2,4-Trimethylbenzene	95-63-6	**3.6**	3.6	52	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	0.002 J	<0.0021 U	0.0013 J	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	NS	NS	mg/kg	<0.0047 U	<0.0032 U	<0.0038 U	<0.0045 U	<0.0032 U	<0.0032 U	<0.0037 U	<0.0054 U	<0.0038 U	<0.0028 U	<0.0031 U	<0.0029 U	<0.0035 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	NS	NS	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	<0.00098 U	<0.0012 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
1,2-Dichloroethane	107-06-2	0.02	0.02	3.1	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	<0.00098 U	<0.0012 U
1,2-Dichloropropane	78-87-5	NS	NS	NS	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	<0.00098 U	<0.0012 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	**8.4**	8.4	52	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	0.0011 J	<0.0021 U	0.00052 J	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
1,3-Dichloropropane	142-28-9	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
1,4-Diethyl Benzene	105-05-5	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	0.00058 J	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<0.12 U	<0.085 U	<0.1 U	<0.12 U	<0.086 U	<0.084 U	<0.098 U	<0.14 U	<0.1 U	<0.076 U	<0.084 U	<0.079 U	<0.094 U
2,2-Dichloropropane	594-20-7	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
2-Chlorotoluene	95-49-8	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
2-Hexanone (MBK)	591-78-6	NS	NS	NS	mg/kg	<0.016 UJ	<0.011 U	<0.013 U	<0.015 U	<0.011 U	<0.01 U	<0.012 U	<0.018 U	<0.012 U	<0.0095 U	<0.01 U	<0.0098 U	<0.012 U
4-Chlorotoluene	106-43-4	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
4-Ethyltoluene	622-96-8	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	0.00055 J	<0.0021 U	0.00074 J	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	0.027 J	<0.0023 U
Acetone	67-64-1	**0.05**	0.05	100	mg/kg	0.018	0.0056 J	<0.013 U	0.044	<0.011 U	<0.01 U	**0.058**	0.019	<0.012 U	0.021	0.022	<0.0098 U	<0.012 U
Acrylonitrile	107-13-1	NS	NS	NS	mg/kg	<0.0063 U	<0.0042 U	<0.0051 U	<0.006 U	<0.0043 U	<0.0042 U	<0.0049 U	<0.0072 U	<0.005 U	<0.0038 U	<0.0042 U	<0.0039 U	<0.0047 U
Benzene	71-43-2	**0.06**	0.06	4.8	mg/kg	<0.00078 U	<0.00053 U	<0.00063 U	<0.00075 U	<0.00054 U	<0.00053 U	0.00034 J	<0.0009 U	<0.00063 U	0.00032 J	0.00027 J	**0.25**	<0.00058 U
Bromobenzene	108-86-1	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
Bromochloromethane	74-97-5	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
Bromodichloromethane	75-27-4	NS	NS	NS	mg/kg	<0.00078 U	<0.00053 U	<0.00063 U	<0.00075 U	<0.00054 U	<0.00053 U	<0.00062 U	<0.0009 U	<0.00063 U	<0.00048 U	<0.00052 U	<0.00049 U	<0.00058 U
Bromoform	75-25-2	NS	NS	NS	mg/kg	<0.0063 U	<0.0042 U	<0.0051 U	<0.006 U	<0.0043 U	<0.0042 U	<0.0049 U	<0.0072 U	<0.005 U	<0.0038 U	<0.0042 U	<0.0039 U	<0.0047 U
Bromomethane	74-83-9	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
Carbon Disulfide	75-15-0	NS	NS	NS	mg/kg	<0.016 U	<0.011 U	<0.013 U	<0.015 U	<0.011 U	<0.01 U	<0.012 U	<0.018 U	<0.012 U	<0.0095 U	<0.01 U	<0.0098 U	<0.012 U
Carbon Tetrachloride	56-23-5	0.76	0.76	2.4	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	<0.00098 U	<0.0012 U
Chlorobenzene	108-90-7	1.1	1.1	100	mg/kg	<0.00078 U	<0.00053 U	<0.00063 U	<0.00075 U	<0.00054 U	<0.00053 U	<0.00062 U	<0.0009 U	<0.00063 U	<0.00048 U	<0.00052 U	<0.00049 U	<0.00058 U
Chloroethane	75-00-3	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
Chloroform	67-66-3	0.37	0.37	49	mg/kg	<0.0024 U	<0.0016 U	<0.0019 U	<0.0022 U	<0.0016 U	<0.0016 U	<0.0018 U	<0.0027 U	<0.0019 U	<0.0014 U	<0.0016 U	<0.0015 U	<0.0018 U
Chloromethane	74-87-3	NS	NS	NS	mg/kg	<0.0063 U	<0.0042 U	<0.0051 U	<0.006 U	<0.0043 U	<0.0042 U	<0.0049 U	<0.0072 U	<0.005 U	<0.0038 U	<0.0042 U	<0.0039 U	<0.0047 U
Cis-1,2-Dichloroethene	156-59-2	0.25	0.25	100	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	0.12	<0.0012 U
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	mg/kg	<0.00078 U	<0.00053 U	<0.00063 U	<0.00075 U	<0.00054 U	<0.00053 U	<0.00062 U	<0.0009 U	<0.00063 U	<0.00048 U	<0.00052 U	<0.00049 U	<0.00058 U
Cymene	99-87-6	NS	NS	NS	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	0.00015 J	<0.001 U	0.00018 J	<0.0018 U	<0.0012 U	0.00017 J	<0.001 U	<0.00098 U	<0.0012 U
Dibromochloromethane	124-48-1	NS	NS	NS	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	<0.00098 U	<0.0012 U
Dibromomethane	74-95-3	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
Dichlorodifluoromethane	75-71-8	NS	NS	NS	mg/kg	<0.016 U	<0.011 U	<0.013 U	<0.015 U	<0.011 U	<0.01 U	<0.012 U	<0.018 U	<0.012 U	<0.0095 U	<0.01 U	<0.0098 U	<0.012 U
Diethyl Ether (Ethyl Ether)	60-29-7	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
Ethylbenzene	100-41-4	**1**	1	41	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	0.0012	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	0.012 J	<0.0012 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.0063 U	<0.0042 U	<0.0051 U	<0.006 U	<0.0043 U	<0.0042 U	<0.0049 U	<0.0072 U	<0.005 U	<0.0038 U	<0.0042 U	<0.0039 U	<0.0047 U
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	<0.00098 U	<0.0012 U
M,P-Xylene	179601-23-1	NS	NS	NS	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	0.0054	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	0.1 J	<0.0023 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	0.12	100	mg/kg	<0.016 UJ	<0.011 U	<0.013 U	<0.015 U	<0.011 U	<0.01 U	0.0056 J	<0.018 U	<0.012 U	0.005 J	<0.01 U	<0.0098 U	<0.012 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	NS	NS	mg/kg	<0.016 U	<0.011 U	<0.013 U	<0.015 U	<0.011 U	<0.01 U	<0.012 U	<0.018 U	<0.012 U	<0.0095 U	<0.01 U	<0.0098 U	<0.012 U
Methylene Chloride	75-09-2	0.05	0.05	100	mg/kg	<0.0078 U	<0.0053 U	<0.0063 U	<0.0075 U	<0.0054 U	<0.0053 U	<0.0062 U	<0.009 U	<0.0063 U	<0.0048 U	<0.0052 U	<0.0049 U	<0.0058 U
Naphthalene	91-20-3	**12**	12	100	mg/kg	<0.0063 U	<0.0042 U	<0.0051 U	0.004 J	0.74 J	0.0021 J	0.0028 J	<0.0072 U	<0.005 U	<0.0038 U	<0.0042 U	0.059 J	<0.0047 U
n-Butylbenzene	104-51-8	**12**	12	100	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	<0.00098 U	<0.0012 U
n-Propylbenzene	103-65-1	**3.9**	3.9	100	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	<0.00098 U	<0.0012 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	NS	NS	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	0.0039	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	0.044 J	<0.0012 U
Sec-Butylbenzene	135-98-8	11	11	100	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	<0.00098 U	<0.0012 U
Styrene	100-42-5	NS	NS	NS	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	0.00022 J	<0.001 U	0.00027 J	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	<0.00098 U	<0.0012 U
T-Butylbenzene	98-06-6	5.9	5.9	100	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	<0.002 U	<0.0023 U
Tert-Butyl Methyl Ether	1634-04-4	0.93	0.93	100	mg/kg	<0.0031 U	<0.0021 U	<0.0025 U	<0.003 U	<0.0022 U	<0.0021 U	<0.0025 U	<0.0036 U	<0.0025 U	<0.0019 U	<0.0021 U	0.026 J	<0.0023 U
Tetrachloroethene (PCE)	127-18-4	**1.3**	1.3	19	mg/kg	0.00043 J	<0.00053 U	<0.00063 U	<0.00075 U	0.00025 J	<0.00053 U	0.00048 J	0.002	<0.00063 U	<0.00048 U	<0.00052 U	**1.6**	<0.00058 U
Toluene	108-88-3	**0.7**	0.7	100	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.056 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	0.054 J	<0.0012 U
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	NS	NS	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	0.12	<0.0012 U
Total Xylenes	1330-20-7	**0.26**	1.6	100	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	0.0093	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	0.14 J	<0.0012 U
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	NS	NS	NS	mg/kg	<0.00078 U	<0.00053 U	<0.00063 U	<0.00075 U	<0.00054 U	<0.00053 U	<0.00062 U	<0.0009 U	<0.00063 U	<0.00048 U	<0.00052 U	<0.00049 U	<0.00058 U
Trans-1,2-Dichloroethene	156-60-5	0.19	0.19	100	mg/kg	<0.0024 U	<0.0016 U	<0.0019 U	<0.0022 U	<0.0016 U	<0.0016 U	<0.0018 U	<0.0027 U	<0.0019 U	<0.0014 U	<0.0016 U	<0.0015 U	<0.0018 U
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	<0.00098 U	<0.0012 U
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	NS	NS	mg/kg	<0.0078 U	<0.0053 U	<0.0063 U	<0.0075 U	<0.0054 U	<0.0053 U	<0.0062 U	<0.009 U	<0.0063 U	<0.0048 U	<0.0052 U	<0.0049 U	<0.0058 U
Trichloroethene (TCE)	79-01-6	0.47	0.47	21	mg/kg	<0.00078 U	<0.00053 U	<0.00063 U	<0.00075 U	<0.00054 U	<0.00053 U	<0.00062 U	<0.0009 U	<0.00063 U	0.00014 J	<0.00052 U	0.06	<0.00058 U
Trichlorofluoromethane	75-69-4	NS	NS	NS	mg/kg	<0.0063 U	<0.0042 U	<0.0051 U	<0.006 U	<0.0043 U	<0.0042 U	<0.0049 U	<0.0072 U	<0.005 U	<0.0038 U	<0.0042 U	<0.0039 U	<0.0047 U
Vinyl Acetate	108-05-4	NS	NS	NS	mg/kg	<0.016 U	<0.011 U	<0.013 U	<0.015 U	<0.011 U	<0.01 U	<0.012 U	<0.018 U	<0.012 U	<0.0095 U	<0.01 U	<0.0098 U	<0.012 U
Vinyl Chloride	75-01-4	0.02	0.02	0.9	mg/kg	<0.0016 U	<0.0011 U	<0.0013 U	<0.0015 U	<0.0011 U	<0.001 U	<0.0012 U	<0.0018 U	<0.0012 U	<0.00095 U	<0.001 U	<0.00098 U	<0.0012 U
Total VOCs	TOTAL VOCS	NS	NS	NS	mg/kg	0.01843	0.0056	ND	0.048	0.74577	0.0021	0.08157	0.021	ND	0.02663	0.02227	2.472	ND

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB30	SB30	SB30	SB31	SB31	SB31	SB32	SB32	SB32	SB33	SB33	SB33	SB33
					Sample Name	SB30_0-2	SB30_2-4	SB30_6-8	SB31_0-2	SB31_3-5	SB31_5-7	SB32_0-2	SB32_4-6	SB32_6-8	SB33_0-2	SBDUP01_051923	SB33_4-6	SB33_6-8
					Sample Date	05/25/2023	05/25/2023	05/25/2023	05/18/2023	05/18/2023	05/18/2023	05/19/2023	05/19/2023	05/19/2023	05/19/2023	05/19/2023	05/19/2023	05/19/2023
					Sample Depth	0-2	2-4	6-8	0-2	3-5	5-7	0-2	4-6	6-8	0-2	0-2	4-6	6-8
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																		
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<0.13 UJ	<0.026 UJ	<0.028 UJ	<0.13 U	<0.025 U	<0.026 U	<0.14 U	<0.026 U	<0.026 U	<0.027 U	<0.14 U	<0.026 U	<0.027 U
2,4,5-Trichlorophenol	95-95-4	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 UJ	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 UJ	<0.18 U
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	mg/kg	<0.52 U	<0.1 U	<0.11 U	<0.52 U	<0.1 U	<0.1 U	<0.54 UJ	<0.1 U	<0.1 U	<0.11 U	<0.55 U	<0.1 UJ	<0.11 U
2,4-Dichlorophenol	120-83-2	NS	NS	NS	mg/kg	<0.78 U	<0.15 U	<0.17 U	<0.79 U	<0.15 U	<0.16 U	<0.81 UJ	<0.16 U	<0.16 U	<0.16 U	<0.82 U	<0.16 UJ	<0.16 U
2,4-Dimethylphenol	105-67-9	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 UJ	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 UJ	<0.18 U
2,4-Dinitrophenol	51-28-5	NS	NS	NS	mg/kg	<4.1 U	<0.82 U	<0.9 U	<4.2 U	<0.8 U	<0.85 U	<4.3 UJ	<0.83 U	<0.84 U	<0.85 U	<4.4 U	<0.85 UJ	<0.88 U
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
2,6-Dinitrotoluene	606-20-2	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
2-Chloronaphthalene	91-58-7	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
2-Chlorophenol	95-57-8	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 UJ	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 UJ	<0.18 U
2-Methylnaphthalene	91-57-6	NS	NS	NS	mg/kg	0.24 J	<0.21 U	<0.22 U	1.8	1.7	<0.21 U	<1.1 U	<0.21 U	<0.21 U	<0.21 U	<1.1 U	0.41	<0.22 U
2-Methylphenol (o-Cresol)	95-48-7	0.33	0.33	100	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	0.042 J	<0.18 U	<0.9 UJ	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 UJ	<0.18 U
2-Nitroaniline	88-74-4	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
2-Nitrophenol	88-75-5	NS	NS	NS	mg/kg	<1.9 U	<0.37 U	<0.41 U	<1.9 U	<0.36 U	<0.38 U	<1.9 UJ	<0.37 U	<0.38 U	<0.38 U	<2 U	<0.38 UJ	<0.39 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	0.33	100	mg/kg	<1.2 U	<0.25 U	<0.27 U	0.29 J	0.2 J	<0.25 U	<1.3 UJ	<0.25 U	<0.25 U	<0.26 U	<1.3 U	<0.25 UJ	<0.26 U
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
3-Nitroaniline	99-09-2	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	NS	NS	mg/kg	<2.2 U	<0.45 U	<0.49 U	<2.3 U	<0.43 U	<0.46 U	<2.3 UJ	<0.45 U	<0.45 U	<0.46 U	<2.4 U	<0.46 UJ	<0.47 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
4-Chloro-3-Methylphenol	59-50-7	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 UJ	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 UJ	<0.18 U
4-Chloroaniline	106-47-8	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
4-Nitroaniline	100-01-6	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
4-Nitrophenol	100-02-7	NS	NS	NS	mg/kg	<1.2 U	<0.24 U	<0.26 U	<1.2 U	<0.23 U	<0.25 U	<1.3 UJ	<0.24 U	<0.24 U	<0.25 U	<1.3 U	<0.25 UJ	<0.26 U
Acenaphthene	83-32-9	20	98	100	mg/kg	0.94	<0.14 U	<0.15 U	4.4	4	<0.14 U	<0.72 U	0.025 J	<0.14 U	0.035 J	<0.73 U	1.9	<0.14 U
Acenaphthylene	208-96-8	100	107	100	mg/kg	1.2	<0.14 U	<0.15 U	2.5	2.4	<0.14 U	<0.72 U	0.044 J	<0.14 U	<0.14 U	<0.73 U	0.19	<0.14 U
Acetophenone	98-86-2	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
Anthracene	120-12-7	100	1000	100	mg/kg	2.7	<0.1 U	<0.11 U	13	9.9	<0.1 U	<0.54 U	0.08 J	<0.1 U	0.088 J	<0.55 U	3.9	<0.11 U
Benzo(a)anthracene	56-55-3	**1**	1	1	mg/kg	**8.1**	<0.1 U	<0.11 U	**42**	**21**	<0.1 U	0.41 J	0.53	<0.1 U	0.24	0.35 J	**14**	<0.11 U
Benzo(a)pyrene	50-32-8	**1**	22	1	mg/kg	**6.4**	0.076 J	0.061 J	**43**	**20**	<0.14 U	0.45 J	0.63	<0.14 U	0.31	0.37 J	**13**	<0.14 U
Benzo(b)fluoranthene	205-99-2	**1**	1.7	1	mg/kg	**7.5**	0.09 J	0.066 J	**47**	**22**	<0.1 U	0.54	0.83	<0.1 U	0.4	0.47 J	**15**	<0.11 U
Benzo(g,h,i)Perylene	191-24-2	100	1000	100	mg/kg	4	0.043 J	0.03 J	20	11	<0.14 U	0.24 J	0.39	<0.14 U	0.15	0.25 J	4.8	<0.14 U
Benzo(k)fluoranthene	207-08-9	**0.8**	1.7	3.9	mg/kg	**2.2**	0.036 J	<0.11 U	**14**	**3.2**	<0.1 U	0.2 J	0.29	<0.1 U	0.14	<0.55 U	**3.4**	<0.11 U
Benzoic Acid	65-85-0	NS	NS	NS	mg/kg	1.8 J	<0.56 UJ	<0.61 UJ	<2.8 U	<0.54 U	<0.57 U	<2.9 UJ	<0.56 U	<0.56 U	<0.58 U	<3 U	<0.57 UJ	<0.59 U
Benzyl Alcohol	100-51-6	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 UJ	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 UJ	<0.18 U
Benzyl Butyl Phthalate	85-68-7	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	1	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
Biphenyl (Diphenyl)	92-52-4	NS	NS	NS	mg/kg	<2 U	<0.39 U	<0.43 U	0.55 J	0.64	<0.4 U	<2 U	<0.39 U	<0.4 U	<0.4 U	<2.1 U	0.11 J	<0.42 U
Bis(2-chloroethoxy) methane	111-91-1	NS	NS	NS	mg/kg	<0.93 U	<0.18 U	<0.2 U	<0.94 U	<0.18 U	<0.19 U	<0.97 U	<0.19 U	<0.19 U	<0.19 U	<0.99 U	<0.19 U	<0.2 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	NS	NS	mg/kg	<0.78 U	<0.15 U	<0.17 U	<0.79 U	<0.15 U	<0.16 U	<0.81 U	<0.16 U	<0.16 U	<0.16 U	<0.82 U	<0.16 U	<0.16 U
Bis(2-chloroisopropyl) ether	108-60-1	NS	NS	NS	mg/kg	<1 UJ	<0.21 UJ	<0.22 UJ	<1 U	<0.2 U	<0.21 U	<1.1 U	<0.21 U	<0.21 U	<0.21 U	<1.1 U	<0.21 U	<0.22 U
Bis(2-ethylhexyl) phthalate	117-81-7	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	1.5	0.37	<0.18 U	0.33 J	<0.17 U	<0.17 U	0.25	<0.92 U	<0.18 U	<0.18 U
Carbazole	86-74-8	NS	NS	NS	mg/kg	0.52 J	<0.17 U	<0.19 U	2.7	2.3	<0.18 U	<0.9 U	0.042 J	<0.17 U	0.026 J	<0.92 U	1.4	<0.18 U
Chrysene	218-01-9	**1**	1	3.9	mg/kg	**7.7**	0.068 J	0.053 J	**42**	**20**	<0.1 U	0.41 J	0.57	<0.1 U	0.31	0.39 J	**13**	<0.11 U
Dibenz(a,h)anthracene	53-70-3	**0.33**	1000	0.33	mg/kg	**0.93**	<0.1 U	<0.11 U	**4.6**	**1.4**	<0.1 U	<0.54 U	0.1	<0.1 U	0.03 J	<0.55 U	**1.4**	<0.11 U
Dibenzofuran	132-64-9	7	210	59	mg/kg	0.56 J	<0.17 U	<0.19 U	4	3.6	<0.18 U	<0.9 U	<0.17 U	<0.17 U	0.02 J	<0.92 U	0.46	<0.18 U
Dibutyl phthalate	84-74-2	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
Diethyl phthalate	84-66-2	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
Dimethyl phthalate	131-11-3	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
Dioctyl phthalate	117-84-0	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
Fluoranthene	206-44-0	**100**	1000	100	mg/kg	18	0.11	0.11	86	46	<0.1 U	0.89	0.94	<0.1 U	0.51	0.62	28	<0.11 U
Fluorene	86-73-7	30	386	100	mg/kg	0.9	<0.17 U	<0.19 U	4.4	3.7	<0.18 U	<0.9 U	0.022 J	<0.17 U	0.029 J	<0.92 U	1.5	<0.18 U
Hexachlorobenzene	118-74-1	0.33	3.2	1.2	mg/kg	<0.52 U	<0.1 U	<0.11 U	<0.52 U	<0.1 U	<0.1 U	<0.54 U	<0.1 U	<0.1 U	<0.11 U	<0.55 U	<0.1 U	<0.11 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	mg/kg	<2.5 U	<0.49 U	<0.54 U	<2.5 U	<0.48 U	<0.5 U	<2.6 UJ	<0.49 UJ	<0.5 UJ	<0.51 UJ	<2.6 UJ	<0.5 UJ	<0.52 UJ
Hexachloroethane	67-72-1	NS	NS	NS	mg/kg	<0.69 U	<0.14 U	<0.15 U	<0.7 U	<0.13 U	<0.14 U	<0.72 U	<0.14 U	<0.14 U	<0.14 U	<0.73 U	<0.14 U	<0.14 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	8.2	0.5	mg/kg	**4.4**	0.049 J	0.036 J	**24**	**13**	<0.14 U	0.28 J	0.49	<0.14 U	0.11 J	0.26 J	**6.3**	<0.14 U
Isophorone	78-59-1	NS	NS	NS	mg/kg	<0.78 U	<0.15 U	<0.17 U	<0.79 U	<0.15 U	<0.16 U	<0.81 U	<0.16 U	<0.16 U	<0.16 U	<0.82 U	<0.16 U	<0.16 U
Naphthalene	91-20-3	**12**	12	100	mg/kg	0.29 J	<0.17 U	<0.19 U	3.2	2.9	<0.18 U	<0.9 U	<0.17 U	<0.17 U	0.042 J	<0.92 U	0.34	<0.18 U
Nitrobenzene	98-95-3	NS	NS	NS	mg/kg	<0.78 U	<0.15 U	<0.17 U	<0.79 U	<0.15 U	<0.16 U	<0.81 U	<0.16 U	<0.16 U	<0.16 U	<0.82 U	<0.16 U	<0.16 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	NS	NS	mg/kg	<0.86 U	<0.17 U	<0.19 U	<0.88 U	<0.17 U	<0.18 U	<0.9 U	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 U	<0.18 U
n-Nitrosodiphenylamine	86-30-6	NS	NS	NS	mg/kg	<0.69 U	<0.14 U	<0.15 U	<0.7 U	<0.13 U	<0.14 U	<0.72 U	<0.14 U	<0.14 U	<0.14 U	<0.73 U	<0.14 U	<0.14 U
Pentachlorophenol	87-86-5	0.8	0.8	6.7	mg/kg	<0.69 U	<0.14 U	<0.15 U	<0.7 U	<0.13 U	<0.14 U	<0.72 UJ	<0.14 U	<0.14 U	<0.14 U	<0.73 U	<0.14 UJ	<0.14 U
Phenanthrene	85-01-8	100	1000	100	mg/kg	12	0.061 J	0.098 J	75	52	<0.1 U	0.69	0.35	<0.1 U	0.3	0.44 J	26	<0.11 U
Phenol	108-95-2	0.33	0.33	100	mg/kg	<0.86 U	<0.17 U	<0.19 U	0.22 J	0.15 J	<0.18 U	<0.9 UJ	<0.17 U	<0.17 U	<0.18 U	<0.92 U	<0.18 UJ	<0.18 U
Pyrene	129-00-0	**100**	1000	100	mg/kg	18	0.1	0.1 J	90	46	<0.1 U	0.78	0.88	<0.1 U	0.53	0.62	26	<0.11 U

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB30	SB30	SB30	SB31	SB31	SB31	SB32	SB32	SB32	SB33	SB33	SB33	SB33
					Sample Name	SB30_0-2	SB30_2-4	SB30_6-8	SB31_0-2	SB31_3-5	SB31_5-7	SB32_0-2	SB32_4-6	SB32_6-8	SB33_0-2	SBDUP01_051923	SB33_4-6	SB33_6-8
					Sample Date	05/25/2023	05/25/2023	05/25/2023	05/18/2023	05/18/2023	05/18/2023	05/19/2023	05/19/2023	05/19/2023	05/19/2023	05/19/2023	05/19/2023	05/19/2023
					Sample Depth	0-2	2-4	6-8	0-2	3-5	5-7	0-2	4-6	6-8	0-2	0-2	4-6	6-8
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																		
4,4'-DDD	72-54-8	**0.0033**	14	13	mg/kg	**0.0252 J**	<0.00158 U	<0.00176 U	**0.0207**	<0.00162 U	<0.00161 U	<0.00168 U	<0.00161 U	<0.00169 U	<0.00163 U	<0.00168 U	<0.00168 U	<0.00172 U
4,4'-DDE	72-55-9	**0.0033**	17	8.9	mg/kg	**0.0272**	<0.00158 U	<0.00176 U	**0.0226 J**	<0.00162 U	<0.00161 U	**0.00447**	0.00138 J	<0.00169 U	0.00137 J	0.00147 J	<0.00168 U	<0.00172 U
4,4'-DDT	50-29-3	**0.0033**	136	7.9	mg/kg	**0.371**	<0.00158 U	<0.00176 U	**0.145 J**	<0.00162 U	<0.00161 U	<0.00168 U	0.0026	<0.00169 U	<0.00163 U	<0.00168 U	<0.00168 U	<0.00172 U
Aldrin	309-00-2	**0.005**	0.19	0.097	mg/kg	<0.00159 U	<0.00158 U	<0.00176 U	<0.00164 U	<0.00162 U	<0.00161 U	**0.00527**	0.000614 J	<0.00169 U	<0.00163 U	<0.00168 U	<0.00168 U	<0.00172 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	0.02	0.48	mg/kg	<0.000663 U	<0.000659 U	<0.000735 U	<0.000681 U	<0.000673 U	<0.000671 U	<0.000701 U	<0.00067 U	<0.000705 U	<0.00068 U	<0.0007 U	<0.000699 U	<0.000717 U
Alpha Chlordane	5103-71-9	**0.094**	2.9	4.2	mg/kg	**0.13**	<0.00198 U	<0.0022 U	0.0046 J	<0.00202 U	<0.00201 U	0.0131	0.00145 J	<0.00211 U	0.0028 J	0.00277 J	<0.0021 U	<0.00215 U
Alpha Endosulfan	959-98-8	2.4	102	24	mg/kg	<0.00159 U	<0.00158 U	<0.00176 U	<0.00164 U	<0.00162 U	<0.00161 U	<0.00168 U	<0.00161 U	<0.00169 U	<0.00163 U	<0.00168 U	<0.00168 U	<0.00172 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	0.09	0.36	mg/kg	<0.00159 U	<0.00158 U	<0.00176 U	<0.00164 U	<0.00162 U	<0.00161 U	<0.00168 U	<0.00161 U	<0.00169 U	<0.00163 U	<0.00168 U	<0.00168 U	<0.00172 U
Beta Endosulfan	33213-65-9	2.4	102	24	mg/kg	<0.00159 U	<0.00158 U	<0.00176 U	<0.00164 U	<0.00162 U	<0.00161 U	<0.00168 U	<0.00161 U	<0.00169 U	<0.00163 U	<0.00168 U	<0.00168 U	<0.00172 U
Chlordane (alpha and gamma)	57-74-9	NS	NS	NS	mg/kg	0.826 J	<0.0132 U	<0.0147 U	0.312	<0.0135 U	<0.0134 U	0.128	0.0109 J	<0.0141 U	0.0391	0.0324	<0.014 U	<0.0143 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	0.25	100	mg/kg	<0.00159 U	<0.00158 U	<0.00176 U	0.00171 J	<0.00162 U	<0.00161 U	<0.00168 U	<0.00161 U	<0.00169 U	<0.00163 U	<0.00168 U	<0.00168 U	<0.00172 U
Dieldrin	60-57-1	**0.005**	0.1	0.2	mg/kg	<0.000994 U	<0.000989 U	<0.0011 U	**0.00545 J**	<0.00101 U	<0.00101 U	0.00336 J	0.000502 J	<0.00106 U	0.000628 J	0.000578 J	<0.00105 U	<0.00108 U
Endosulfan Sulfate	1031-07-8	2.4	1000	24	mg/kg	<0.000663 U	<0.000659 U	<0.000735 U	<0.000681 U	<0.000673 U	<0.000671 U	<0.000701 U	<0.00067 U	<0.000705 U	<0.00068 U	<0.0007 U	<0.000699 U	<0.000717 U
Endrin	72-20-8	0.014	0.06	11	mg/kg	<0.000663 U	<0.000659 U	<0.000735 U	<0.000681 U	<0.000673 U	<0.000671 U	<0.000701 U	<0.00067 U	<0.000705 U	<0.00068 U	<0.0007 U	<0.000699 U	<0.000717 U
Endrin Aldehyde	7421-93-4	NS	NS	NS	mg/kg	<0.00199 U	<0.00198 U	<0.0022 U	<0.00204 U	<0.00202 U	<0.00201 U	<0.0021 U	<0.00201 U	<0.00211 U	<0.00204 U	<0.0021 U	<0.0021 U	<0.00215 U
Endrin Ketone	53494-70-5	NS	NS	NS	mg/kg	<0.00159 U	<0.00158 U	<0.00176 U	<0.00164 U	<0.00162 U	<0.00161 U	<0.00168 U	<0.00161 U	<0.00169 U	<0.00163 U	<0.00168 U	<0.00168 U	<0.00172 U
Gamma Bhc (Lindane)	58-89-9	0.1	0.1	1.3	mg/kg	<0.000663 U	<0.000659 U	<0.000735 U	<0.000681 U	<0.000673 U	<0.000671 U	<0.000701 U	<0.00067 U	<0.000705 U	<0.00068 U	<0.0007 U	<0.000699 U	<0.000717 U
Gamma Chlordane (Trans)	5103-74-2	NS	NS	NS	mg/kg	0.109	<0.00198 U	<0.0022 U	0.00936	<0.00202 U	<0.00201 U	0.0157	0.00167 J	<0.00211 U	0.0038	0.00339	<0.0021 U	<0.00215 U
Heptachlor	76-44-8	0.042	0.38	2.1	mg/kg	0.00718 J	<0.000791 U	<0.000882 U	<0.000818 U	<0.000808 U	<0.000806 U	0.00154	<0.000804 U	<0.000846 U	<0.000816 U	<0.000839 U	<0.000839 U	<0.00086 U
Heptachlor Epoxide	1024-57-3	NS	NS	NS	mg/kg	<0.00298 U	<0.00297 U	<0.00331 U	<0.00307 U	<0.00303 U	<0.00302 U	<0.00316 U	<0.00301 U	<0.00317 U	<0.00306 U	<0.00315 U	<0.00314 U	<0.00323 U
Methoxychlor	72-43-5	NS	NS	NS	mg/kg	0.00822 J	<0.00297 U	<0.00331 U	<0.00307 U	<0.00303 U	<0.00302 U	<0.00316 U	<0.00301 U	<0.00317 U	<0.00306 U	<0.00315 U	<0.00314 U	<0.00323 U
Toxaphene	8001-35-2	NS	NS	NS	mg/kg	<0.0298 U	<0.0297 U	<0.0331 U	<0.0307 U	<0.0303 U	<0.0302 U	<0.0316 U	<0.0301 U	<0.0317 U	<0.0306 U	<0.0315 U	<0.0314 U	<0.0323 U
Herbicides																		
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	NS	NS	mg/kg	<0.174 U	<0.172 U	<0.186 U	<0.176 U	<0.168 U	<0.176 U	<0.179 U	<0.169 U	<0.173 U	<0.178 U	<0.182 U	<0.175 U	<0.182 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	NS	NS	mg/kg	<0.174 U	<0.172 U	<0.186 U	<0.176 U	<0.168 U	<0.176 U	<0.179 U	<0.169 U	<0.173 U	<0.178 U	<0.182 U	<0.175 U	<0.182 U
Silvex (2,4,5-Tp)	93-72-1	3.8	3.8	100	mg/kg	<0.174 U	<0.172 U	<0.186 U	<0.176 U	<0.168 U	<0.176 U	<0.179 U	<0.169 U	<0.173 U	<0.178 U	<0.182 U	<0.175 U	<0.182 U
Polychlorinated Biphenyl																		
PCB-1016 (Aroclor 1016)	12674-11-2	NS	NS	NS	mg/kg	<0.0507 U	<0.0489 U	<0.0528 U	<0.0495 U	<0.0494 U	<0.0487 U	<0.0501 U	<0.0515 U	<0.0524 U	<0.0522 U	<0.0527 U	<0.051 U	<0.0516 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	NS	NS	mg/kg	<0.0507 U	<0.0489 U	<0.0528 U	<0.0495 U	<0.0494 U	<0.0487 U	<0.0501 U	<0.0515 U	<0.0524 U	<0.0522 U	<0.0527 U	<0.051 U	<0.0516 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	NS	NS	mg/kg	<0.0507 U	<0.0489 U	<0.0528 U	<0.0495 U	<0.0494 U	<0.0487 U	<0.0501 U	<0.0515 U	<0.0524 U	<0.0522 U	<0.0527 U	<0.051 U	<0.0516 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	NS	NS	mg/kg	0.0329 J	<0.0489 U	<0.0528 U	<0.0495 U	<0.0494 U	<0.0487 U	0.0728	<0.0515 U	<0.0524 U	<0.0522 U	<0.0527 U	<0.051 U	<0.0516 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	NS	NS	mg/kg	<0.0507 U	<0.0489 U	<0.0528 U	<0.0495 U	<0.0494 U	<0.0487 U	<0.0501 U	<0.0515 U	<0.0524 U	<0.0522 U	<0.0527 U	<0.051 U	<0.0516 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	NS	NS	mg/kg	<0.0507 U	<0.0489 U	<0.0528 U	<0.0495 U	<0.0494 U	<0.0487 U	0.0174 J	<0.0515 U	<0.0524 U	0.00748 J	0.0063 J	<0.051 U	<0.0516 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	NS	NS	mg/kg	<0.0507 U	<0.0489 U	<0.0528 U	0.0115 J	<0.0494 U	<0.0487 U	<0.0501 U	<0.0515 U	<0.0524 U	<0.0522 U	<0.0527 U	0.0166 J	<0.0516 U
PCB-1262 (Aroclor 1262)	37324-23-5	NS	NS	NS	mg/kg	<0.0507 U	<0.0489 U	<0.0528 U	<0.0495 U	<0.0494 U	<0.0487 U	<0.0501 U	<0.0515 U	<0.0524 U	<0.0522 U	<0.0527 U	<0.051 U	<0.0516 U
PCB-1268 (Aroclor 1268)	11100-14-4	NS	NS	NS	mg/kg	<0.0507 U	<0.0489 U	<0.0528 U	0.00602 J	<0.0494 U	<0.0487 U	<0.0501 U	<0.0515 U	<0.0524 U	<0.0522 U	<0.0527 U	<0.051 U	<0.0516 U
Total PCBs	1336-36-3	0.1	3.2	1	mg/kg	0.0329 J	<0.0489 U	<0.0528 U	0.0175 J	<0.0494 U	<0.0487 U	0.0902 J	<0.0515 U	<0.0524 U	0.00748 J	0.0063 J	0.0166 J	<0.0516 U
Metals																		
Aluminum	7429-90-5	NS	NS	NS	mg/kg	2,970	516	552	3,900	553	269	4,590	1,080	270	4,190	4,060	2,380	335
Antimony	7440-36-0	NS	NS	NS	mg/kg	<4.04 U	<4.01 U	<4.47 U	3.13 J	<3.99 U	<4.02 U	0.928 J	0.544 J	<4.13 U	1.13 J	0.966 J	0.819 J	<4.19 U
Arsenic	7440-38-2	13	16	16	mg/kg	1.82	0.737 J	0.422 J	3.02	0.823	0.337 J	2.74	1.79	0.502 J	3.32	3.46	3.41	0.352 J
Barium	7440-39-3	**350**	820	400	mg/kg	157	5.68	2.67	**606**	5.17	1.83	41.6	29.9	3.4	34.1	32.5	36	4.13
Beryllium	7440-41-7	7.2	47	72	mg/kg	0.179 J	0.054 J	0.046 J	0.091 J	<0.399 U	<0.402 U	0.329 J	0.147 J	0.051 J	0.263 J	0.259 J	0.207 J	0.048 J
Cadmium	7440-43-9	2.5	7.5	4.3	mg/kg	1.32 J	<0.801 U	<0.894 U	0.736 J	<0.797 U	<0.804 U	0.172 J	0.158 J	<0.825 U	0.204 J	0.196 J	0.238 J	<0.838 U
Calcium	7440-70-2	NS	NS	NS	mg/kg	30,200	481	372	29,200	399	223	35,400	6,300	273	36,300	33,300	21,200	260
Chromium, Hexavalent	18540-29-9	**1**	19	110	mg/kg	0.355 J	<0.833 UJ	<0.916 UJ	<0.855 U	<0.817 U	<0.856 U	0.197 J	0.301 J	<0.849 U	0.603 J	0.554 J	0.79 J	<0.881 U
Chromium, Total	7440-47-3	NS	NS	NS	mg/kg	8.44	3.67	2.78	15.2	3.97	2.17	11.8	8.01	2.63	12.4	15.6	10	2.66
Chromium, Trivalent	16065-83-1	**30**	NS	180	mg/kg	8.08 J	3.67	2.78	15.2	3.97	2.17	11.6 J	7.71 J	2.63	11.8 J	15 J	9.21 J	2.66
Cobalt	7440-48-4	NS	NS	NS	mg/kg	4.43	0.318 J	0.29 J	3.59	0.447 J	0.192 J	3.68	1.28 J	0.253 J	4.11	3.87	1.93	0.284 J
Copper	7440-50-8	**50**	1720	270	mg/kg	41.1 J	1.03	0.718 J	25.5	0.942	0.339 J	19.2	11	0.297 J	25.6	21.5	22.9	0.746 J
Cyanide	57-12-5	27	40	27	mg/kg	<0.97 UJ	<0.96 UJ	<1.1 UJ	<1 UJ	<1 UJ	<1 UJ	<1.1 U	<1 U	<1 U	<1 U	<1.1 U	<0.97 U	<1 U
Iron	7439-89-6	NS	NS	NS	mg/kg	6,400	1,930	1,120	8,080	1,680	645	7,650	4,200	840	8,620	9,010	5,700	817
Lead	7439-92-1	**63**	450	400	mg/kg	**135 J**	32.6	1.63 J	**707**	9.92	1.3 J	29.5	**89.2**	2.87 J	30.3	28.4	**124**	2.24 J
Magnesium	7439-95-4	NS	NS	NS	mg/kg	12,600	172	274	6,000	231	118	6,580	2,040	113	8,330	9,200	4,860	145
Manganese	7439-96-5	1600	2000	2000	mg/kg	263	22	11.2	178	24.5	11.5	123	56.8	14.4	131	129	83.9	14
Mercury	7439-97-6	**0.18**	0.73	0.81	mg/kg	**0.186**	0.162	<0.073 U	**0.251**	<0.065 U	<0.067 U	0.068 J	0.065 J	<0.069 U	<0.075 U	<0.082 U	0.064 J	<0.078 U
Nickel	7440-02-0	30	130	310	mg/kg	10	0.902 J	1.62 J	13.9	1.74 J	0.648 J	8.54	3.44	0.69 J	10.6	12.1	8.01	1.02 J
Potassium	7440-09-7	NS	NS	NS	mg/kg	447 J	<200 U	<224 U	459	<199 U	<201 U	634	157 J	51.1 J	711	727	288	78.8 J
Selenium	7782-49-2	3.9	4	180	mg/kg	0.27 J	<1.6 U	<1.79 U	<1.63 U	<1.59 U	<1.61 U	<1.69 U	<1.6 U	<1.65 U	<1.63 U	<1.74 U	<1.64 U	<1.68 U
Silver	7440-22-4	2	8.3	180	mg/kg	<0.404 U	<0.401 U	<0.447 U	<0.407 U	<0.399 U	<0.402 U	<0.422 U	<0.401 U	<0.413 U	<0.409 U	<0.435 U	<0.409 U	<0.419 U
Sodium	7440-23-5	NS	NS	NS	mg/kg	<162 U	<160 U	<179 U	168	<159 U	<161 U	256	102 J	19.2 J	244	245	120 J	40.2 J
Thallium	7440-28-0	NS	NS	NS	mg/kg	0.368 J	<1.6 U	<1.79 U	<1.63 U	<1.59 U	<1.61 U	<1.69 U	<1.6 U	<1.65 U	<1.63 U	<1.74 U	<1.64 U	<1.68 U
Vanadium	7440-62-2	NS	NS	NS	mg/kg	11.2	4.6	2.35	16	4.12	1.64	18	11.4	2.58	21.3	20.8	12.7	2.22
Zinc	7440-66-6	**109**	2480	10000	mg/kg	**186**	14.4	22	**467**	67.5	15.2	43.1	39.7	2.25 J	44.7	41.1	69.7	7.34
General Chemistry																		
Total Solids	TSOLID	NS	NS	NS	Percent	95.8	96	87.3	93.6	97.9	93.4	91.3	96.2	94.2	92.9	90.3	93.7	90.8

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB30	SB30	SB30	SB31	SB31	SB31	SB32	SB32	SB32	SB33	SB33	SB33	SB33
					Sample Name	SB30_0-2	SB30_2-4	SB30_6-8	SB31_0-2	SB31_3-5	SB31_5-7	SB32_0-2	SB32_4-6	SB32_6-8	SB33_0-2	SBDUP01_051923	SB33_4-6	SB33_6-8
					Sample Date	05/25/2023	05/25/2023	05/25/2023	05/18/2023	05/18/2023	05/18/2023	05/19/2023	05/19/2023	05/19/2023	05/19/2023	05/19/2023	05/19/2023	05/19/2023
					Sample Depth	0-2	2-4	6-8	0-2	3-5	5-7	0-2	4-6	6-8	0-2	0-2	4-6	6-8
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances																		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	763051-92-9	NS	NS	NS	mg/kg	<0.000798 U	<0.000795 U	<0.000786 U	<0.000799 U	<0.000792 U	<0.000796 U	<0.000799 U	<0.000783 U	<0.000791 U	<0.00079 U	<0.000795 U	<0.000785 U	<0.000789 U
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2FTS)	39108-34-4	NS	NS	NS	mg/kg	<0.000798 UJ	<0.000795 U	<0.000786 U	<0.000799 UJ	<0.000792 U	<0.000796 U	<0.000799 U	<0.000783 U	<0.000791 U	<0.00079 U	<0.000795 U	<0.000785 U	<0.000789 U
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	NS	NS	mg/kg	<0.000798 U	<0.000795 U	<0.000786 U	<0.000799 U	<0.000792 U	<0.000796 U	<0.000799 U	<0.000783 U	<0.000791 U	<0.00079 U	<0.000795 U	<0.000785 U	<0.000789 U
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2FTS)	27619-97-2	NS	NS	NS	mg/kg	<0.000798 U	<0.000795 U	<0.000786 U	<0.000799 U	<0.000792 U	<0.000796 U	<0.000799 U	<0.000783 U	<0.000791 U	<0.00079 U	<0.000795 U	<0.000785 U	<0.000789 U
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3FTCA)	914637-49-3	NS	NS	NS	mg/kg	<0.00499 U	<0.00497 U	<0.00491 U	<0.00499 U	<0.00495 U	<0.00498 U	<0.005 U	<0.00489 U	<0.00494 U	<0.00494 U	<0.00497 U	<0.0049 U	<0.00493 U
3-Perfluoroheptyl Propanoic Acid (7:3FTCA)	812-70-4	NS	NS	NS	mg/kg	<0.00499 U	<0.00497 U	<0.00491 U	<0.00499 U	<0.00495 U	<0.00498 U	<0.005 U	<0.00489 U	<0.00494 U	<0.00494 U	<0.00497 U	<0.0049 U	<0.00493 U
3-Perfluoropropyl Propanoic Acid (3:3FTCA)	356-02-5	NS	NS	NS	mg/kg	<0.000998 U	<0.000994 U	<0.000982 U	<0.000998 U	<0.00099 U	<0.000995 U	<0.000999 U	<0.000979 U	<0.000988 U	<0.000988 U	<0.000994 U	<0.000981 U	<0.000987 U
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	NS	NS	NS	mg/kg	<0.000798 U	<0.000795 U	<0.000786 U	<0.000799 U	<0.000792 U	<0.000796 U	<0.000799 U	<0.000783 U	<0.000791 U	<0.00079 U	<0.000795 U	<0.000785 U	<0.000789 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid	756426-58-1	NS	NS	NS	mg/kg	<0.000798 U	<0.000795 U	<0.000786 U	<0.000799 U	<0.000792 U	<0.000796 U	<0.000799 U	<0.000783 U	<0.000791 U	<0.00079 U	<0.000795 U	<0.000785 U	<0.000789 U
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	NS	NS	mg/kg	<0.000798 U	<0.000795 U	<0.000786 U	<0.000799 U	<0.000792 U	<0.000796 U	<0.000799 U	<0.000783 U	<0.000791 U	<0.00079 U	<0.000795 U	<0.000785 U	<0.000789 U
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	NS	NS	mg/kg	<0.0002 UJ	<0.000199 U	<0.000196 U	<0.0002 UJ	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	NS	NS	mg/kg	<0.002 U	<0.00199 U	<0.00196 U	<0.002 U	<0.00198 U	<0.00199 U	<0.002 U	<0.00196 U	<0.00198 U	<0.00198 U	<0.00199 U	<0.00196 U	<0.00197 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA	2355-31-9	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 UJ	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	NS	NS	mg/kg	<0.002 U	<0.00199 U	<0.00196 U	<0.002 UJ	<0.00198 U	<0.00199 U	<0.002 U	<0.00196 U	<0.00198 U	<0.00198 U	<0.00199 U	<0.00196 U	<0.00197 U
Nonafluoro-3,6-dioxaheptanoic acid	151772-58-6	NS	NS	NS	mg/kg	<0.000399 U	<0.000398 U	<0.000393 U	<0.000399 U	<0.000396 U	<0.000398 U	<0.0004 U	<0.000392 U	<0.000395 U	<0.000395 U	<0.000398 U	<0.000392 U	<0.000395 U
Perfluoro(2-ethoxyethane)sulfonic acid	113507-82-7	NS	NS	NS	mg/kg	<0.000399 U	<0.000398 U	<0.000393 U	<0.000399 U	<0.000396 U	<0.000398 U	<0.0004 U	<0.000392 U	<0.000395 U	<0.000395 U	<0.000398 U	<0.000392 U	<0.000395 U
Perfluoro-3-methoxypropanoic acid	377-73-1	NS	NS	NS	mg/kg	<0.000399 U	<0.000398 U	<0.000393 U	<0.000399 U	<0.000396 U	<0.000398 U	<0.0004 U	<0.000392 U	<0.000395 U	<0.000395 U	<0.000398 U	<0.000392 U	<0.000395 U
Perfluoro-4-methoxybutanoic acid	863090-89-5	NS	NS	NS	mg/kg	<0.000399 U	<0.000398 U	<0.000393 U	<0.000399 U	<0.000396 U	<0.000398 U	<0.0004 U	<0.000392 U	<0.000395 U	<0.000395 U	<0.000398 U	<0.000392 U	<0.000395 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	NS	NS	mg/kg	0.000168 J	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
Perfluorobutanoic acid (PFBA)	375-22-4	NS	NS	NS	mg/kg	<0.000798 U	<0.000795 U	<0.000786 U	<0.000799 U	<0.000792 U	<0.000796 U	<0.000799 U	<0.000783 U	<0.000791 U	<0.00079 U	<0.000795 U	<0.000785 U	<0.000789 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	0.001	0.044	mg/kg	**0.00104**	0.000382	<0.000196 U	**0.000903**	0.00023	0.000191 J	0.000136 J	0.000603	0.00015 J	<0.000198 U	<0.000199 U	0.000604	0.000205
Perfluorooctanoic Acid (PFOA)	335-67-1	0.00066	0.0008	0.033	mg/kg	0.000072 J	0.000072 J	0.000071 J	<0.0002 U	<0.000198 U	<0.000199 U	0.000112 J	0.000086 J	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	0.000095 J
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	NS	NS	mg/kg	<0.000399 U	<0.000398 U	<0.000393 U	<0.000399 U	<0.000396 U	<0.000398 U	<0.0004 U	<0.000392 U	<0.000395 U	<0.000395 U	<0.000398 U	<0.000392 U	<0.000395 U
Perfluoropentansulfonic Acid (PFPeS)	2706-91-4	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 UJ	<0.000197 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	NS	NS	mg/kg	<0.0002 U	<0.000199 U	<0.000196 U	<0.0002 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000196 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000196 U	<0.000197 U

Table 1A
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Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB34	SB34	SB34	SB35	SB35	SB35	SB36	SB36	SB36	SB37	SB37	SB37
					Sample Name	SB34_0-2	SB34_2-4	SB34_5-7	SB35_0-2	SB35_8-10	SB35_14-16	SB36_0-2	SB36_11-13	SB36_14-16	SB37_0-2	SB37_2-4	SB37_4-6
					Sample Date	05/19/2023	05/19/2023	05/19/2023	05/23/2023	05/23/2023	05/23/2023	05/18/2023	05/18/2023	05/18/2023	05/18/2023	05/18/2023	05/18/2023
					Sample Depth	0-2	2-4	5-7	0-2	8-10	14-16	0-2	11-13	14-16	0-2	2-4	4-6
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																	
1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	NS	mg/kg	<0.00057 U	<0.00047 U	<0.00053 U	<0.00057 U	<0.23 U	<0.00056 U	<0.00056 U	<0.00054 U	<0.00059 U	<0.0005 U	<0.00056 U	<0.00052 U
1,1,1-Trichloroethane	71-55-6	0.68	0.68	100	mg/kg	<0.00057 U	<0.00047 U	<0.00053 U	<0.00057 U	<0.23 U	<0.00056 U	<0.00056 U	<0.00054 U	<0.00059 U	<0.0005 U	<0.00056 U	<0.00052 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	mg/kg	<0.00057 U	<0.00047 U	<0.00053 U	<0.00057 U	<0.23 U	<0.00056 U	<0.00056 U	<0.00054 U	<0.00059 U	<0.0005 U	<0.00056 U	<0.00052 U
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	<0.46 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
1,1-Dichloroethane	75-34-3	0.27	0.27	26	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	<0.46 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
1,1-Dichloroethene	75-35-4	0.33	0.33	100	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	<0.46 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
1,1-Dichloropropene	563-58-6	NS	NS	NS	mg/kg	<0.00057 U	<0.00047 U	<0.00053 U	<0.00057 U	<0.23 U	<0.00056 U	<0.00056 U	<0.00054 U	<0.00059 U	<0.0005 U	<0.00056 U	<0.00052 U
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
1,2,3-Trichloropropane	96-18-4	NS	NS	NS	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
1,2,4,5-Tetramethylbenzene	95-93-2	NS	NS	NS	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	0.00024 J	47	<0.0022 U	<0.0022 U	0.001 J	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
1,2,4-Trimethylbenzene	95-63-6	**3.6**	3.6	52	mg/kg	0.00065 J	<0.0019 U	<0.0021 U	0.00078 J	**470**	0.00063 J	<0.0022 U	0.0013 J	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	NS	NS	mg/kg	<0.0034 U	<0.0028 U	<0.0032 U	<0.0034 U	<1.4 U	<0.0033 U	<0.0034 U	<0.0033 U	<0.0035 U	<0.003 U	<0.0034 U	<0.0031 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	NS	NS	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	<0.46 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
1,2-Dichloroethane	107-06-2	0.02	0.02	3.1	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	<0.46 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
1,2-Dichloropropane	78-87-5	NS	NS	NS	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	<0.46 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	**8.4**	8.4	52	mg/kg	0.00031 J	<0.0019 U	<0.0021 U	0.00029 J	**130**	<0.0022 U	<0.0022 U	0.0003 J	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
1,3-Dichloropropane	142-28-9	NS	NS	NS	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
1,4-Diethyl Benzene	105-05-5	NS	NS	NS	mg/kg	0.00032 J	<0.0019 U	<0.0021 U	<0.0023 U	160	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<0.09 U	<0.076 U	<0.086 U	<0.09 U	<36 U	<0.089 U	<0.09 U	<0.087 U	<0.094 U	<0.08 U	<0.09 U	<0.084 U
2,2-Dichloropropane	594-20-7	NS	NS	NS	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
2-Chlorotoluene	95-49-8	NS	NS	NS	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
2-Hexanone (MBK)	591-78-6	NS	NS	NS	mg/kg	<0.011 U	<0.0094 U	<0.011 U	<0.011 U	<4.6 U	<0.011 U	<0.011 U	<0.011 U	<0.012 U	<0.01 U	<0.011 U	<0.01 U
4-Chlorotoluene	106-43-4	NS	NS	NS	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
4-Ethyltoluene	622-96-8	NS	NS	NS	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	0.00045 J	380	<0.0022 U	<0.0022 U	0.00058 J	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
Acetone	67-64-1	**0.05**	0.05	100	mg/kg	0.024	<0.0094 U	<0.011 U	0.025	**3.9 J**	0.01 J	0.012	0.013	<0.012 U	0.013	<0.011 U	<0.01 U
Acrylonitrile	107-13-1	NS	NS	NS	mg/kg	<0.0045 U	<0.0038 U	<0.0043 U	<0.0045 U	<1.8 U	<0.0044 U	<0.0045 U	<0.0044 U	<0.0047 U	<0.004 U	<0.0045 U	<0.0042 U
Benzene	71-43-2	**0.06**	0.06	4.8	mg/kg	0.0032	0.00026 J	<0.00053 U	0.0017	<0.23 U	<0.00056 U	<0.00056 U	<0.00054 U	<0.00059 U	<0.0005 U	<0.00056 U	<0.00052 U
Bromobenzene	108-86-1	NS	NS	NS	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
Bromochloromethane	74-97-5	NS	NS	NS	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
Bromodichloromethane	75-27-4	NS	NS	NS	mg/kg	<0.00057 U	<0.00047 U	<0.00053 U	<0.00057 U	<0.23 U	<0.00056 U	<0.00056 U	<0.00054 U	<0.00059 U	<0.0005 U	<0.00056 U	<0.00052 U
Bromoform	75-25-2	NS	NS	NS	mg/kg	<0.0045 U	<0.0038 U	<0.0043 U	<0.0045 U	<1.8 U	<0.0044 U	<0.0045 U	<0.0044 U	<0.0047 U	<0.004 U	<0.0045 U	<0.0042 U
Bromomethane	74-83-9	NS	NS	NS	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
Carbon Disulfide	75-15-0	NS	NS	NS	mg/kg	<0.011 U	<0.0094 U	<0.011 U	<0.011 U	<4.6 U	<0.011 U	<0.011 U	<0.011 U	<0.012 U	<0.01 U	<0.011 U	<0.01 U
Carbon Tetrachloride	56-23-5	0.76	0.76	2.4	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	<0.46 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
Chlorobenzene	108-90-7	1.1	1.1	100	mg/kg	<0.00057 U	<0.00047 U	<0.00053 U	<0.00057 U	<0.23 U	<0.00056 U	<0.00056 U	<0.00054 U	<0.00059 U	<0.0005 U	<0.00056 U	<0.00052 U
Chloroethane	75-00-3	NS	NS	NS	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
Chloroform	67-66-3	0.37	0.37	49	mg/kg	<0.0017 U	<0.0014 U	<0.0016 U	<0.0017 U	<0.68 U	<0.0017 U	<0.0017 U	<0.0016 U	<0.0018 U	<0.0015 U	<0.0017 U	<0.0016 U
Chloromethane	74-87-3	NS	NS	NS	mg/kg	<0.0045 U	<0.0038 U	<0.0043 U	<0.0045 U	<1.8 U	<0.0044 U	<0.0045 U	<0.0044 U	<0.0047 U	<0.004 U	<0.0045 U	<0.0042 U
Cis-1,2-Dichloroethene	156-59-2	0.25	0.25	100	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	<0.46 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	mg/kg	<0.00057 U	<0.00047 U	<0.00053 U	<0.00057 U	<0.23 U	<0.00056 U	<0.00056 U	<0.00054 U	<0.00059 U	<0.0005 U	<0.00056 U	<0.00052 U
Cymene	99-87-6	NS	NS	NS	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	4.2	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
Dibromochloromethane	124-48-1	NS	NS	NS	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	<0.46 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
Dibromomethane	74-95-3	NS	NS	NS	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
Dichlorodifluoromethane	75-71-8	NS	NS	NS	mg/kg	<0.011 U	<0.0094 U	<0.011 U	<0.011 U	<4.6 U	<0.011 U	<0.011 U	<0.011 U	<0.012 U	<0.01 U	<0.011 U	<0.01 U
Diethyl Ether (Ethyl Ether)	60-29-7	NS	NS	NS	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
Ethylbenzene	100-41-4	**1**	1	41	mg/kg	0.00058 J	<0.00094 U	<0.0011 U	0.00024 J	**37**	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.0045 U	<0.0038 U	<0.0043 U	<0.0045 U	<1.8 U	<0.0044 U	<0.0045 U	<0.0044 U	<0.0047 U	<0.004 U	<0.0045 U	<0.0042 U
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	14	<0.0011 U	<0.0011 U	0.0011	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
M,P-Xylene	179601-23-1	NS	NS	NS	mg/kg	0.0007 J	<0.0019 U	<0.0021 U	0.0008 J	250	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	0.12	100	mg/kg	0.0029 J	<0.0094 U	<0.011 U	0.0039 J	<4.6 U	<0.011 U	<0.011 U	<0.011 U	<0.012 U	0.0047 J	<0.011 U	<0.01 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	NS	NS	mg/kg	<0.011 U	<0.0094 U	<0.011 U	<0.011 U	<4.6 U	<0.011 U	<0.011 U	<0.011 U	<0.012 U	<0.01 U	<0.011 U	<0.01 U
Methylene Chloride	75-09-2	0.05	0.05	100	mg/kg	<0.0057 U	<0.0047 U	<0.0053 U	<0.0057 U	<2.3 U	<0.0056 U	<0.0056 U	<0.0054 U	<0.0059 U	<0.005 U	<0.0056 U	<0.0052 U
Naphthalene	91-20-3	**12**	12	100	mg/kg	0.016	<0.0038 U	<0.0043 U	0.003 J	**56**	<0.0044 U	0.00073 J	<0.0044 U	<0.0047 U	<0.004 U	<0.0045 U	<0.0042 U
n-Butylbenzene	104-51-8	**12**	12	100	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	**21**	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
n-Propylbenzene	103-65-1	**3.9**	3.9	100	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	**56**	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	NS	NS	mg/kg	0.00064 J	<0.00094 U	<0.0011 U	0.00046 J	86	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
Sec-Butylbenzene	135-98-8	11	11	100	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	7.5	<0.0011 U	<0.0011 U	0.00048 J	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
Styrene	100-42-5	NS	NS	NS	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	0.14 J	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
T-Butylbenzene	98-06-6	5.9	5.9	100	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
Tert-Butyl Methyl Ether	1634-04-4	0.93	0.93	100	mg/kg	<0.0023 U	<0.0019 U	<0.0021 U	<0.0023 U	<0.91 U	<0.0022 U	<0.0022 U	<0.0022 U	<0.0024 U	<0.002 U	<0.0022 U	<0.0021 U
Tetrachloroethene (PCE)	127-18-4	**1.3**	1.3	19	mg/kg	<0.00057 U	<0.00047 U	<0.00053 U	<0.00057 U	<0.23 U	<0.00056 U	<0.00056 U	<0.00054 U	<0.00059 U	<0.0005 U	<0.00056 U	<0.00052 U
Toluene	108-88-3	**0.7**	0.7	100	mg/kg	0.00092 J	<0.00094 U	<0.0011 U	0.0016	**0.78**	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	NS	NS	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	<0.46 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
Total Xylenes	1330-20-7	**0.26**	1.6	100	mg/kg	0.0013 J	<0.00094 U	<0.0011 U	0.0013 J	**340**	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	NS	NS	NS	mg/kg	<0.00057 U	<0.00047 U	<0.00053 U	<0.00057 U	<0.23 U	<0.00056 U	<0.00056 U	<0.00054 U	<0.00059 U	<0.0005 U	<0.00056 U	<0.00052 U
Trans-1,2-Dichloroethene	156-60-5	0.19	0.19	100	mg/kg	<0.0017 U	<0.0014 U	<0.0016 U	<0.0017 U	<0.68 U	<0.0017 U	<0.0017 U	<0.0016 U	<0.0018 U	<0.0015 U	<0.0017 U	<0.0016 U
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	<0.46 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	NS	NS	mg/kg	<0.0057 U	<0.0047 U	<0.0053 U	<0.0057 U	<2.3 U	<0.0056 U	<0.0056 U	<0.0054 U	<0.0059 U	<0.005 U	<0.0056 U	<0.0052 U
Trichloroethene (TCE)	79-01-6	0.47	0.47	21	mg/kg	<0.00057 U	<0.00047 U	<0.00053 U	<0.00057 U	<0.23 U	<0.00056 U	<0.00056 U	<0.00054 U	<0.00059 U	<0.0005 U	<0.00056 U	<0.00052 U
Trichlorofluoromethane	75-69-4	NS	NS	NS	mg/kg	<0.0045 U	<0.0038 U	<0.0043 U	<0.0045 U	<1.8 U	<0.0044 U	<0.0045 U	<0.0044 U	<0.0047 U	<0.004 U	<0.0045 U	<0.0042 U
Vinyl Acetate	108-05-4	NS	NS	NS	mg/kg	<0.011 U	<0.0094 U	<0.011 U	<0.011 U	<4.6 U	<0.011 U	<0.011 U	<0.011 U	<0.012 U	<0.01 U	<0.011 U	<0.01 U
Vinyl Chloride	75-01-4	0.02	0.02	0.9	mg/kg	<0.0011 U	<0.00094 U	<0.0011 U	<0.0011 U	<0.46 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.001 U	<0.0011 U	<0.001 U
Total VOCs	TOTAL VOCS	NS	NS	NS	mg/kg	0.05022	0.00026	ND	0.03846	1723.52	0.01063	0.01273	0.01776	ND	0.0177	ND	ND

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB34	SB34	SB34	SB35	SB35	SB35	SB36	SB36	SB36	SB37	SB37	SB37
					Sample Name	SB34_0-2	SB34_2-4	SB34_5-7	SB35_0-2	SB35_8-10	SB35_14-16	SB36_0-2	SB36_11-13	SB36_14-16	SB37_0-2	SB37_2-4	SB37_4-6
					Sample Date	05/19/2023	05/19/2023	05/19/2023	05/23/2023	05/23/2023	05/23/2023	05/18/2023	05/18/2023	05/18/2023	05/18/2023	05/18/2023	05/18/2023
					Sample Depth	0-2	2-4	5-7	0-2	8-10	14-16	0-2	11-13	14-16	0-2	2-4	4-6
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																	
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<0.14 U	<0.13 U	<0.027 U	<0.14 U	<0.028 U	<0.029 U	<0.029 U	<0.03 U	<0.031 U	<0.13 U	<0.026 U	<0.027 U
2,4,5-Trichlorophenol	95-95-4	NS	NS	NS	mg/kg	<0.94 UJ	<0.86 U	<0.18 U	<0.9 UJ	<0.19 U	<0.19 U	<0.19 UJ	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	mg/kg	<0.56 UJ	<0.52 U	<0.11 U	<0.54 UJ	<0.11 U	<0.12 U	<0.12 UJ	<0.12 U	<0.12 U	<0.52 U	<0.11 U	<0.11 U
2,4-Dichlorophenol	120-83-2	NS	NS	NS	mg/kg	<0.85 UJ	<0.78 U	<0.16 U	<0.81 UJ	<0.17 U	<0.17 U	<0.17 UJ	<0.18 U	<0.18 U	<0.78 U	<0.16 U	<0.16 U
2,4-Dimethylphenol	105-67-9	NS	NS	NS	mg/kg	<0.94 UJ	<0.86 U	<0.18 U	<0.9 UJ	<0.19 U	<0.19 U	<0.19 UJ	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
2,4-Dinitrophenol	51-28-5	NS	NS	NS	mg/kg	<4.5 UJ	<4.1 U	<0.86 U	<4.3 UJ	<0.91 U	<0.93 U	<0.93 UJ	<0.95 U	<0.99 U	<4.2 U	<0.85 U	<0.85 U
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
2,6-Dinitrotoluene	606-20-2	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
2-Chloronaphthalene	91-58-7	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
2-Chlorophenol	95-57-8	NS	NS	NS	mg/kg	<0.94 UJ	<0.86 U	<0.18 U	<0.9 UJ	<0.19 U	<0.19 U	<0.19 UJ	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
2-Methylnaphthalene	91-57-6	NS	NS	NS	mg/kg	1.1	<1 U	<0.22 U	<1.1 U	20	0.12 J	0.03 J	<0.24 U	<0.25 U	<1 U	0.07 J	<0.21 U
2-Methylphenol (o-Cresol)	95-48-7	0.33	0.33	100	mg/kg	<0.94 UJ	<0.86 U	<0.18 U	<0.9 UJ	<0.19 U	<0.19 U	<0.19 UJ	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
2-Nitroaniline	88-74-4	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
2-Nitrophenol	88-75-5	NS	NS	NS	mg/kg	<2 UJ	<1.9 U	<0.39 U	<1.9 UJ	<0.41 U	<0.42 U	<0.42 UJ	<0.43 U	<0.44 U	<1.9 U	<0.38 U	<0.38 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	0.33	100	mg/kg	<1.4 UJ	<1.2 U	<0.26 U	<1.3 UJ	<0.27 U	<0.28 U	<0.28 UJ	<0.29 U	<0.3 U	<1.2 U	<0.25 U	<0.26 U
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
3-Nitroaniline	99-09-2	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	NS	NS	mg/kg	<2.4 UJ	<2.2 U	<0.47 U	<2.3 UJ	<0.49 U	<0.5 U	<0.5 UJ	<0.52 U	<0.54 U	<2.2 U	<0.46 U	<0.46 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
4-Chloro-3-Methylphenol	59-50-7	NS	NS	NS	mg/kg	<0.94 UJ	<0.86 U	<0.18 U	<0.9 UJ	<0.19 U	<0.19 U	<0.19 UJ	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
4-Chloroaniline	106-47-8	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 UJ	<0.19 UJ	<0.19 UJ	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
4-Nitroaniline	100-01-6	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
4-Nitrophenol	100-02-7	NS	NS	NS	mg/kg	<1.3 UJ	<1.2 U	<0.25 U	<1.3 UJ	<0.26 U	<0.27 U	<0.27 UJ	<0.28 U	<0.29 U	<1.2 U	<0.25 U	<0.25 U
Acenaphthene	83-32-9	20	98	100	mg/kg	2.1	<0.69 U	<0.14 U	<0.72 U	0.084 J	0.026 J	0.057 J	<0.16 U	<0.16 U	<0.69 U	0.082 J	<0.14 U
Acenaphthylene	208-96-8	100	107	100	mg/kg	<0.75 U	<0.69 U	<0.14 U	<0.72 U	0.052 J	<0.15 U	0.032 J	<0.16 U	<0.16 U	<0.69 U	0.16	<0.14 U
Acetophenone	98-86-2	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
Anthracene	120-12-7	100	1000	100	mg/kg	3.7	0.18 J	<0.11 U	<0.54 U	0.11	<0.12 U	0.16	<0.12 U	<0.12 U	<0.52 U	0.28	<0.11 U
Benzo(a)anthracene	56-55-3	**1**	1	1	mg/kg	**4.8**	0.56	<0.11 U	0.57	0.17	<0.12 U	0.35	<0.12 U	<0.12 U	0.18 J	0.89	<0.11 U
Benzo(a)pyrene	50-32-8	**1**	22	1	mg/kg	**4.5**	0.66 J	<0.14 U	0.64 J	0.19	<0.15 U	0.33	<0.16 U	<0.16 U	0.24 J	0.82	<0.14 U
Benzo(b)fluoranthene	205-99-2	**1**	1.7	1	mg/kg	**3.6**	0.73	<0.11 U	0.9	0.22	<0.12 U	0.37	<0.12 U	<0.12 U	0.28 J	1	<0.11 U
Benzo(g,h,i)Perylene	191-24-2	100	1000	100	mg/kg	1.7	0.39 J	<0.14 U	<0.72 U	<0.15 U	<0.15 U	0.22	<0.16 U	<0.16 U	0.19 J	0.53	<0.14 U
Benzo(k)fluoranthene	207-08-9	**0.8**	1.7	3.9	mg/kg	**1.4**	0.25 J	<0.11 U	<0.54 U	<0.11 U	<0.12 U	0.12	<0.12 U	<0.12 U	<0.52 U	0.28	<0.11 U
Benzoic Acid	65-85-0	NS	NS	NS	mg/kg	<3 UJ	<2.8 U	<0.58 U	<2.9 UJ	<0.61 U	<0.62 U	<0.63 UJ	<0.64 U	<0.67 U	<2.8 U	<0.57 U	<0.58 U
Benzyl Alcohol	100-51-6	NS	NS	NS	mg/kg	<0.94 UJ	<0.86 U	<0.18 U	<0.9 UJ	<0.19 U	<0.19 U	<0.19 UJ	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
Benzyl Butyl Phthalate	85-68-7	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
Biphenyl (Diphenyl)	92-52-4	NS	NS	NS	mg/kg	0.22 J	<2 U	<0.41 U	<2 U	0.28 J	<0.44 U	<0.44 U	<0.45 U	<0.47 U	<2 U	<0.4 U	<0.4 U
Bis(2-chloroethoxy) methane	111-91-1	NS	NS	NS	mg/kg	<1 U	<0.93 U	<0.19 U	<0.97 U	<0.2 U	<0.21 U	<0.21 U	<0.21 U	<0.22 U	<0.93 U	<0.19 U	<0.19 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	NS	NS	mg/kg	<0.85 U	<0.78 U	<0.16 U	<0.81 U	<0.17 U	<0.17 U	<0.17 U	<0.18 U	<0.18 U	<0.78 U	<0.16 U	<0.16 U
Bis(2-chloroisopropyl) ether	108-60-1	NS	NS	NS	mg/kg	<1.1 U	<1 U	<0.22 U	<1.1 U	<0.23 U	<0.23 U	<0.23 U	<0.24 U	<0.25 U	<1 U	<0.21 U	<0.21 U
Bis(2-ethylhexyl) phthalate	117-81-7	NS	NS	NS	mg/kg	0.37 J	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	0.078 J	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
Carbazole	86-74-8	NS	NS	NS	mg/kg	0.25 J	<0.86 U	<0.18 U	<0.9 U	0.026 J	<0.19 U	0.047 J	<0.2 U	<0.21 U	<0.86 U	0.1 J	<0.18 U
Chrysene	218-01-9	**1**	1	3.9	mg/kg	**4.6**	0.54	<0.11 U	0.84	0.2	<0.12 U	0.38	<0.12 U	<0.12 U	0.2 J	0.98	<0.11 U
Dibenz(a,h)anthracene	53-70-3	**0.33**	1000	0.33	mg/kg	**0.57**	0.1 J	<0.11 U	<0.54 U	<0.11 U	<0.12 U	0.047 J	<0.12 U	<0.12 U	<0.52 U	0.12	<0.11 U
Dibenzofuran	132-64-9	7	210	59	mg/kg	0.52 J	<0.86 U	<0.18 U	<0.9 U	0.049 J	<0.19 U	0.045 J	<0.2 U	<0.21 U	<0.86 U	0.059 J	0.033 J
Dibutyl phthalate	84-74-2	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
Diethyl phthalate	84-66-2	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
Dimethyl phthalate	131-11-3	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
Dioctyl phthalate	117-84-0	NS	NS	NS	mg/kg	0.46 J	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
Fluoranthene	206-44-0	**100**	1000	100	mg/kg	7.3	1	<0.11 U	0.95	0.4	<0.12 U	0.74	<0.12 U	<0.12 U	0.36 J	1.8	0.058 J
Fluorene	86-73-7	30	386	100	mg/kg	2.2	<0.86 U	<0.18 U	<0.9 U	0.18 J	<0.19 U	0.068 J	<0.2 U	<0.21 U	<0.86 U	0.086 J	0.022 J
Hexachlorobenzene	118-74-1	0.33	3.2	1.2	mg/kg	<0.56 U	<0.52 U	<0.11 U	<0.54 U	<0.11 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.52 U	<0.11 U	<0.11 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	mg/kg	<2.7 UJ	<2.5 UJ	<0.51 UJ	<2.6 UJ	<0.54 UJ	<0.55 UJ	<0.55 UJ	<0.57 U	<0.59 U	<2.5 U	<0.51 U	<0.51 U
Hexachloroethane	67-72-1	NS	NS	NS	mg/kg	<0.75 U	<0.69 U	<0.14 U	<0.72 U	<0.15 U	<0.15 U	<0.16 U	<0.16 U	<0.16 U	<0.69 U	<0.14 U	<0.14 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	8.2	0.5	mg/kg	**2**	0.44 J	<0.14 U	<0.72 U	<0.15 U	<0.15 U	0.21	<0.16 U	<0.16 U	0.19 J	**0.55**	<0.14 U
Isophorone	78-59-1	NS	NS	NS	mg/kg	<0.85 U	<0.78 U	<0.16 U	<0.81 U	<0.17 U	<0.17 U	<0.17 U	<0.18 U	<0.18 U	<0.78 U	<0.16 U	<0.16 U
Naphthalene	91-20-3	**12**	12	100	mg/kg	0.34 J	<0.86 U	<0.18 U	<0.9 U	**16**	0.4	0.069 J	<0.2 U	<0.21 U	<0.86 U	0.17 J	0.031 J
Nitrobenzene	98-95-3	NS	NS	NS	mg/kg	<0.85 U	<0.78 U	<0.16 U	<0.81 U	<0.17 U	<0.17 U	<0.17 U	<0.18 U	<0.18 U	<0.78 U	<0.16 U	<0.16 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	NS	NS	mg/kg	<0.94 U	<0.86 U	<0.18 U	<0.9 U	<0.19 U	<0.19 U	<0.19 U	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
n-Nitrosodiphenylamine	86-30-6	NS	NS	NS	mg/kg	<0.75 U	<0.69 U	<0.14 U	<0.72 U	<0.15 U	<0.15 U	<0.16 U	<0.16 U	<0.16 U	<0.69 U	<0.14 U	<0.14 U
Pentachlorophenol	87-86-5	0.8	0.8	6.7	mg/kg	<0.75 UJ	<0.69 U	<0.14 U	<0.72 UJ	<0.15 U	<0.15 U	<0.16 UJ	<0.16 U	<0.16 U	<0.69 U	<0.14 U	<0.14 U
Phenanthrene	85-01-8	100	1000	100	mg/kg	13	0.64	<0.11 U	0.58	0.52	0.034 J	0.65	<0.12 U	<0.12 U	0.2 J	1.3	0.11
Phenol	108-95-2	0.33	0.33	100	mg/kg	<0.94 UJ	<0.86 U	<0.18 U	<0.9 UJ	<0.19 U	<0.19 U	<0.19 UJ	<0.2 U	<0.21 U	<0.86 U	<0.18 U	<0.18 U
Pyrene	129-00-0	**100**	1000	100	mg/kg	9.8	0.94	<0.11 U	1.1	0.42	<0.12 U	0.75	<0.12 U	<0.12 U	0.35 J	1.7	0.034 J

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB34	SB34	SB34	SB35	SB35	SB35	SB36	SB36	SB36	SB37	SB37	SB37
					Sample Name	SB34_0-2	SB34_2-4	SB34_5-7	SB35_0-2	SB35_8-10	SB35_14-16	SB36_0-2	SB36_11-13	SB36_14-16	SB37_0-2	SB37_2-4	SB37_4-6
					Sample Date	05/19/2023	05/19/2023	05/19/2023	05/23/2023	05/23/2023	05/23/2023	05/18/2023	05/18/2023	05/18/2023	05/18/2023	05/18/2023	05/18/2023
					Sample Depth	0-2	2-4	5-7	0-2	8-10	14-16	0-2	11-13	14-16	0-2	2-4	4-6
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																	
4,4'-DDD	72-54-8	**0.0033**	14	13	mg/kg	<0.00181 U	<0.00166 U	<0.0017 U	<0.00174 U	<0.00174 U	<0.00183 U	<0.00186 U	<0.00194 U	<0.00196 U	0.000662 J	0.00104 J	<0.00167 U
4,4'-DDE	72-55-9	**0.0033**	17	8.9	mg/kg	0.00138 J	0.000642 J	<0.0017 U	0.000889 J	<0.00174 U	<0.00183 U	0.0014 J	<0.00194 U	<0.00196 U	0.00138 J	0.00078 J	<0.00167 U
4,4'-DDT	50-29-3	**0.0033**	136	7.9	mg/kg	<0.00181 U	<0.00166 U	<0.0017 U	<0.00174 U	<0.00174 U	<0.00183 U	<0.00186 U	<0.00194 U	<0.00196 U	0.00279 J	**0.00418**	<0.00167 U
Aldrin	309-00-2	**0.005**	0.19	0.097	mg/kg	<0.00181 U	<0.00166 U	<0.0017 U	<0.00174 U	<0.00174 U	<0.00183 U	<0.00186 U	<0.00194 U	<0.00196 U	<0.00159 U	<0.00163 U	<0.00167 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	0.02	0.48	mg/kg	<0.000754 U	<0.000691 U	<0.000706 U	<0.000727 U	<0.000725 U	<0.000764 U	<0.000776 U	<0.000808 U	<0.000816 U	<0.000664 U	<0.000681 U	<0.000697 U
Alpha Chlordane	5103-71-9	**0.094**	2.9	4.2	mg/kg	0.00207 J	0.00518 J	<0.00212 U	0.000985 J	<0.00218 U	<0.00229 U	0.00739 J	<0.00242 U	<0.00245 U	0.00422	0.00302 J	<0.00209 U
Alpha Endosulfan	959-98-8	2.4	102	24	mg/kg	<0.00181 U	<0.00166 U	<0.0017 U	<0.00174 U	<0.00174 U	<0.00183 U	<0.00186 U	<0.00194 U	<0.00196 U	<0.00159 U	<0.00163 U	<0.00167 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	0.09	0.36	mg/kg	<0.00181 U	<0.00166 U	<0.0017 U	<0.00174 U	<0.00174 U	<0.00183 U	<0.00186 U	<0.00194 U	<0.00196 U	<0.00159 U	<0.00163 U	<0.00167 U
Beta Endosulfan	33213-65-9	2.4	102	24	mg/kg	<0.00181 U	<0.00166 U	<0.0017 U	<0.00174 U	<0.00174 U	<0.00183 U	<0.00186 U	<0.00194 U	<0.00196 U	<0.00159 U	<0.00163 U	<0.00167 U
Chlordane (alpha and gamma)	57-74-9	NS	NS	NS	mg/kg	0.0108 J	0.0483	<0.0141 U	0.00909 J	<0.0145 U	<0.0153 U	0.0954	<0.0162 U	<0.0163 U	<0.0133 U	0.0209	<0.0139 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	0.25	100	mg/kg	<0.00181 U	<0.00166 U	<0.0017 U	<0.00174 U	<0.00174 U	<0.00183 U	<0.00186 U	<0.00194 U	<0.00196 U	<0.00159 U	<0.00163 U	<0.00167 U
Dieldrin	60-57-1	**0.005**	0.1	0.2	mg/kg	<0.00113 U	0.00187	<0.00106 U	<0.00109 U	<0.00109 U	<0.00114 U	0.00118	<0.00121 U	<0.00122 U	0.00131 J	<0.00102 U	<0.00104 U
Endosulfan Sulfate	1031-07-8	2.4	1000	24	mg/kg	<0.000754 U	<0.000691 U	<0.000706 U	<0.000727 U	<0.000725 U	<0.000764 U	<0.000776 U	<0.000808 U	<0.000816 U	<0.000664 U	<0.000681 U	<0.000697 U
Endrin	72-20-8	0.014	0.06	11	mg/kg	<0.000754 U	<0.000691 U	<0.000706 U	<0.000727 U	<0.000725 U	<0.000764 U	0.000756 J	<0.000808 U	<0.000816 U	<0.000664 U	<0.000681 U	<0.000697 U
Endrin Aldehyde	7421-93-4	NS	NS	NS	mg/kg	<0.00226 U	<0.00207 U	<0.00212 U	<0.00218 U	<0.00218 U	<0.00229 U	<0.00233 U	<0.00242 U	<0.00245 U	<0.00199 U	<0.00204 U	<0.00209 U
Endrin Ketone	53494-70-5	NS	NS	NS	mg/kg	<0.00181 U	<0.00166 U	<0.0017 U	<0.00174 U	<0.00174 U	<0.00183 U	<0.00186 U	<0.00194 U	<0.00196 U	<0.00159 U	<0.00163 U	<0.00167 U
Gamma Bhc (Lindane)	58-89-9	0.1	0.1	1.3	mg/kg	<0.000754 U	<0.000691 U	<0.000706 U	<0.000727 U	<0.000725 U	<0.000764 U	<0.000776 U	<0.000808 U	<0.000816 U	<0.000664 U	<0.000681 U	<0.000697 U
Gamma Chlordane (Trans)	5103-74-2	NS	NS	NS	mg/kg	0.00187 J	0.00754	<0.00212 U	0.00129 J	<0.00218 U	<0.00229 U	0.0132	<0.00242 U	<0.00245 U	0.00362	0.00314 J	<0.00209 U
Heptachlor	76-44-8	0.042	0.38	2.1	mg/kg	<0.000905 U	0.000681 J	<0.000848 U	<0.000873 U	<0.00087 U	<0.000917 U	0.00086 J	<0.000969 U	<0.000979 U	<0.000797 U	<0.000817 U	<0.000836 U
Heptachlor Epoxide	1024-57-3	NS	NS	NS	mg/kg	<0.00339 U	<0.00311 U	<0.00318 U	<0.00327 U	<0.00326 U	<0.00344 U	<0.00349 U	<0.00363 U	<0.00367 U	<0.00299 U	<0.00306 U	<0.00314 U
Methoxychlor	72-43-5	NS	NS	NS	mg/kg	<0.00339 U	<0.00311 U	<0.00318 U	<0.00327 U	<0.00326 U	<0.00344 U	<0.00349 U	<0.00363 U	<0.00367 U	<0.00299 U	<0.00306 U	<0.00314 U
Toxaphene	8001-35-2	NS	NS	NS	mg/kg	<0.0339 U	<0.0311 U	<0.0318 U	<0.0327 U	<0.0326 U	<0.0344 U	<0.0349 U	<0.0363 U	<0.0367 U	<0.0299 U	<0.0306 U	<0.0314 U
Herbicides																	
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	NS	NS	mg/kg	<0.188 U	<0.173 U	<0.18 U	<0.181 U	<0.188 U	<0.195 U	<0.19 U	<0.198 U	<0.203 U	<0.174 U	<0.174 U	<0.177 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	NS	NS	mg/kg	<0.188 U	<0.173 U	<0.18 U	<0.181 U	<0.188 U	<0.195 U	<0.19 U	<0.198 U	<0.203 U	<0.174 U	<0.174 U	<0.177 U
Silvex (2,4,5-Tp)	93-72-1	3.8	3.8	100	mg/kg	<0.188 U	<0.173 U	<0.18 U	<0.181 U	<0.188 U	<0.195 U	<0.19 U	<0.198 U	<0.203 U	<0.174 U	<0.174 U	<0.177 U
Polychlorinated Biphenyl																	
PCB-1016 (Aroclor 1016)	12674-11-2	NS	NS	NS	mg/kg	<0.0553 U	<0.0507 U	<0.0497 U	<0.0515 U	<0.055 U	<0.0574 U	<0.0533 U	<0.0568 U	<0.057 U	<0.0516 U	<0.0484 U	<0.052 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	NS	NS	mg/kg	<0.0553 U	<0.0507 U	<0.0497 U	<0.0515 U	<0.055 U	<0.0574 U	<0.0533 U	<0.0568 U	<0.057 U	<0.0516 U	<0.0484 U	<0.052 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	NS	NS	mg/kg	<0.0553 U	<0.0507 U	<0.0497 U	<0.0515 U	<0.055 U	<0.0574 U	<0.0533 U	<0.0568 U	<0.057 U	<0.0516 U	<0.0484 U	<0.052 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	NS	NS	mg/kg	<0.0553 U	<0.0507 U	<0.0497 U	<0.0515 U	<0.055 U	<0.0574 U	<0.0533 U	<0.0568 U	<0.057 U	<0.0516 U	<0.0484 U	<0.052 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	NS	NS	mg/kg	<0.0553 U	<0.0507 U	<0.0497 U	<0.0515 U	<0.055 U	<0.0574 U	<0.0533 U	<0.0568 U	<0.057 U	<0.0516 U	<0.0484 U	<0.052 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	NS	NS	mg/kg	0.00706 J	<0.0507 U	<0.0497 U	<0.0515 U	<0.055 U	<0.0574 U	<0.0533 U	<0.0568 U	<0.057 U	<0.0516 U	<0.0484 U	<0.052 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	NS	NS	mg/kg	<0.0553 U	<0.0507 U	<0.0497 U	<0.0515 U	<0.055 U	<0.0574 U	<0.0533 U	<0.0568 U	<0.057 U	0.0101 J	<0.0484 U	<0.052 U
PCB-1262 (Aroclor 1262)	37324-23-5	NS	NS	NS	mg/kg	<0.0553 U	<0.0507 U	<0.0497 U	<0.0515 U	<0.055 U	<0.0574 U	<0.0533 U	<0.0568 U	<0.057 U	<0.0516 U	<0.0484 U	<0.052 U
PCB-1268 (Aroclor 1268)	11100-14-4	NS	NS	NS	mg/kg	<0.0553 U	<0.0507 U	<0.0497 U	<0.0515 U	<0.055 U	<0.0574 U	<0.0533 U	<0.0568 U	<0.057 U	0.0067 J	<0.0484 U	<0.052 U
Total PCBs	1336-36-3	0.1	3.2	1	mg/kg	0.00706 J	<0.0507 U	<0.0497 U	<0.0515 U	<0.055 U	<0.0574 U	<0.0533 U	<0.0568 U	<0.057 U	0.0168 J	<0.0484 U	<0.052 U
Metals																	
Aluminum	7429-90-5	NS	NS	NS	mg/kg	4,560	2,790	414	5,170	615	1,680	7,410	441	619	5,560	2,870	500
Antimony	7440-36-0	NS	NS	NS	mg/kg	1.08 J	1.15 J	<4.22 U	<4.32 U	<4.44 U	<4.59 U	<4.49 U	<4.7 U	<4.72 U	<4.01 U	<4 U	<4.07 U
Arsenic	7440-38-2	13	16	16	mg/kg	3.33	2.56	0.628 J	2.98 J	0.854 J	2.01	7.31	0.276 J	0.813 J	3.22	5.24	0.728 J
Barium	7440-39-3	**350**	820	400	mg/kg	39.6	73.8	2.9	43.7	11	4.21	93	1.75	1.8	50.9	89.2	13
Beryllium	7440-41-7	7.2	47	72	mg/kg	0.307 J	0.21 J	0.074 J	0.215 J	0.069 J	0.13 J	0.161 J	<0.47 U	<0.472 U	0.047 J	0.148 J	<0.407 U
Cadmium	7440-43-9	2.5	7.5	4.3	mg/kg	0.186 J	0.373 J	0.111 J	<0.863 U	<0.887 U	<0.918 U	0.629 J	<0.939 U	0.095 J	0.227 J	0.362 J	<0.815 U
Calcium	7440-70-2	NS	NS	NS	mg/kg	55,000	22,100	378	44,100	1,030	420	58,900	218	130	36,200	15,200	668
Chromium, Hexavalent	18540-29-9	**1**	19	110	mg/kg	0.273 J	0.675 J	<0.872 U	**1.54**	<0.911 U	<0.941 U	0.338 J	<0.977 U	<0.992 U	0.413 J	0.468 J	<0.856 U
Chromium, Total	7440-47-3	NS	NS	NS	mg/kg	12.6	8.41	4.32	13.8 J	5.04	6.09	21.5	1.97	2.14	12.5	13.1	4.08
Chromium, Trivalent	16065-83-1	**30**	NS	180	mg/kg	12.3 J	7.74 J	4.32	12.3	5.04	6.09	21.2 J	1.97	2.14	12.1 J	12.6 J	4.08
Cobalt	7440-48-4	NS	NS	NS	mg/kg	4.38	2.99	0.407 J	4.38	0.662 J	1.71 J	6.79	0.295 J	0.694 J	5.81	2.91	0.387 J
Copper	7440-50-8	**50**	1720	270	mg/kg	18	25.8	0.618 J	32.2	2.33	1.79	47.4	0.358 J	0.639 J	41.3	23.9	1.51
Cyanide	57-12-5	27	40	27	mg/kg	<1.1 U	<1 U	<1 U	<1.1 UJ	<1 UJ	<1.1 UJ	<1.1 UJ	<1.1 UJ	<1.2 UJ	<1 UJ	<0.98 UJ	<1 UJ
Iron	7439-89-6	NS	NS	NS	mg/kg	8,110	6,670	1,510	9,480	2,170	3,440	15,300	762	1,240	13,400	6,990	2,290
Lead	7439-92-1	**63**	450	400	mg/kg	24.7	**203**	2.54 J	17.5	41.3	2.21 J	**110**	0.775 J	1 J	57.1	**306**	34
Magnesium	7439-95-4	NS	NS	NS	mg/kg	7,580	4,760	188	10,400	223	810	6,900	205	300	10,400	3,220	207
Manganese	7439-96-5	1600	2000	2000	mg/kg	153	99.3	18.2	140 J	21.7	28.9	240	8.59	11.7	170	106	35.6
Mercury	7439-97-6	**0.18**	0.73	0.81	mg/kg	<0.081 U	**0.21**	<0.072 U	<0.071 U	<0.078 U	<0.083 U	0.154	<0.077 U	<0.078 U	0.053 J	**0.33**	<0.067 U
Nickel	7440-02-0	30	130	310	mg/kg	8.6	11.7	1 J	8.61	2.63	7.82	28.5	0.999 J	2.66	13.1	9.44	1.33 J
Potassium	7440-09-7	NS	NS	NS	mg/kg	881	560	84.7 J	948 J	106 J	323	1,630	<235 U	<236 U	1,010	420	<204 U
Selenium	7782-49-2	3.9	4	180	mg/kg	<1.74 U	<1.6 U	<1.69 U	<1.73 U	<1.77 U	<1.84 U	0.433 J	<1.88 U	<1.89 U	0.336 J	0.326 J	<1.63 U
Silver	7440-22-4	2	8.3	180	mg/kg	<0.435 U	<0.401 U	<0.422 U	<0.432 U	<0.444 U	<0.459 U	<0.449 U	<0.47 U	<0.472 U	<0.401 U	<0.4 U	<0.407 U
Sodium	7440-23-5	NS	NS	NS	mg/kg	209	183	43.4 J	353 J	<177 U	345	484	<188 U	<189 U	349	<160 U	<163 U
Thallium	7440-28-0	NS	NS	NS	mg/kg	<1.74 U	<1.6 U	<1.69 U	<1.73 U	<1.77 U	<1.84 U	0.352 J	<1.88 U	<1.89 U	0.322 J	<1.6 U	<1.63 U
Vanadium	7440-62-2	NS	NS	NS	mg/kg	16.4	14.3	4.39	22.3	7.25	6.81	27.3	2.05	2.34	37.5	11.8	5.36
Zinc	7440-66-6	**109**	2480	10000	mg/kg	39.5	**119**	28.5	36.4	24	7.62	**110**	2.87 J	3.33 J	89.9	**130**	35.9
General Chemistry																	
Total Solids	TSOLID	NS	NS	NS	Percent	87.8	94.8	91.7	90.5	87.8	85	85.7	81.9	80.6	94.5	93.9	93.4

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB34	SB34	SB34	SB35	SB35	SB35	SB36	SB36	SB36	SB37	SB37	SB37
					Sample Name	SB34_0-2	SB34_2-4	SB34_5-7	SB35_0-2	SB35_8-10	SB35_14-16	SB36_0-2	SB36_11-13	SB36_14-16	SB37_0-2	SB37_2-4	SB37_4-6
					Sample Date	05/19/2023	05/19/2023	05/19/2023	05/23/2023	05/23/2023	05/23/2023	05/18/2023	05/18/2023	05/18/2023	05/18/2023	05/18/2023	05/18/2023
					Sample Depth	0-2	2-4	5-7	0-2	8-10	14-16	0-2	11-13	14-16	0-2	2-4	4-6
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances																	
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	763051-92-9	NS	NS	NS	mg/kg	<0.000798 U	<0.000781 U	<0.000797 U	<0.000784 U	<0.000781 U	<0.000782 U	<0.000796 U	<0.000798 U	<0.000789 U	<0.000794 U	<0.000792 U	<0.000792 U
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2FTS)	39108-34-4	NS	NS	NS	mg/kg	<0.000798 U	<0.000781 U	<0.000797 U	<0.000784 U	<0.000781 U	<0.000782 U	<0.000796 U	<0.000798 U	<0.000789 U	<0.000794 U	<0.000792 U	<0.000792 U
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	NS	NS	mg/kg	<0.000798 U	<0.000781 U	<0.000797 U	<0.000784 U	<0.000781 U	<0.000782 U	<0.000796 U	<0.000798 U	<0.000789 U	<0.000794 U	<0.000792 U	<0.000792 U
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2FTS)	27619-97-2	NS	NS	NS	mg/kg	<0.000798 U	<0.000781 U	<0.000797 U	<0.000784 U	<0.000781 U	<0.000782 U	<0.000796 U	<0.000798 U	<0.000789 U	<0.000794 U	<0.000792 U	<0.000792 U
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3FTCA)	914637-49-3	NS	NS	NS	mg/kg	<0.00499 U	<0.00488 U	<0.00498 U	<0.0049 U	<0.00488 U	<0.00488 U	<0.00498 U	<0.00499 U	<0.00493 U	<0.00496 U	<0.00495 U	<0.00495 U
3-Perfluoroheptyl Propanoic Acid (7:3FTCA)	812-70-4	NS	NS	NS	mg/kg	<0.00499 U	<0.00488 U	<0.00498 U	<0.0049 U	<0.00488 U	<0.00488 U	<0.00498 U	<0.00499 U	<0.00493 U	<0.00496 U	<0.00495 U	<0.00495 U
3-Perfluoropropyl Propanoic Acid (3:3FTCA)	356-02-5	NS	NS	NS	mg/kg	<0.000997 U	<0.000977 U	<0.000997 U	<0.00098 U	<0.000977 U	<0.000977 U	<0.000996 U	<0.000998 U	<0.000986 U	<0.000993 U	<0.00099 U	<0.00099 U
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	NS	NS	NS	mg/kg	<0.000798 U	<0.000781 U	<0.000797 U	<0.000784 U	<0.000781 U	<0.000782 U	<0.000796 U	<0.000798 U	<0.000789 U	<0.000794 U	<0.000792 U	<0.000792 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid	756426-58-1	NS	NS	NS	mg/kg	<0.000798 U	<0.000781 U	<0.000797 U	<0.000784 U	<0.000781 U	<0.000782 U	<0.000796 U	<0.000798 U	<0.000789 U	<0.000794 U	<0.000792 U	<0.000792 U
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	NS	NS	mg/kg	<0.000798 U	<0.000781 U	<0.000797 U	<0.000784 U	<0.000781 U	<0.000782 U	<0.000796 U	<0.000798 U	<0.000789 U	<0.000794 U	<0.000792 U	<0.000792 U
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	NS	NS	mg/kg	<0.00199 U	<0.00195 U	<0.00199 U	<0.00196 U	<0.00195 U	<0.00195 U	<0.00199 U	<0.002 U	<0.00197 U	<0.00198 U	<0.00198 U	<0.00198 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA	2355-31-9	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	NS	NS	mg/kg	<0.00199 U	<0.00195 U	<0.00199 U	<0.00196 U	<0.00195 U	<0.00195 U	<0.00199 U	<0.002 U	<0.00197 U	<0.00198 U	<0.00198 U	<0.00198 U
Nonafluoro-3,6-dioxaheptanoic acid	151772-58-6	NS	NS	NS	mg/kg	<0.000399 U	<0.000391 U	<0.000399 U	<0.000392 U	<0.000391 U	<0.000391 U	<0.000398 U	<0.000399 U	<0.000394 U	<0.000397 U	<0.000396 U	<0.000396 U
Perfluoro(2-ethoxyethane)sulfonic acid	113507-82-7	NS	NS	NS	mg/kg	<0.000399 U	<0.000391 U	<0.000399 U	<0.000392 U	<0.000391 U	<0.000391 U	<0.000398 U	<0.000399 U	<0.000394 U	<0.000397 U	<0.000396 U	<0.000396 U
Perfluoro-3-methoxypropanoic acid	377-73-1	NS	NS	NS	mg/kg	<0.000399 U	<0.000391 U	<0.000399 U	<0.000392 U	<0.000391 U	<0.000391 U	<0.000398 U	<0.000399 U	<0.000394 U	<0.000397 U	<0.000396 U	<0.000396 U
Perfluoro-4-methoxybutanoic acid	863090-89-5	NS	NS	NS	mg/kg	<0.000399 U	<0.000391 U	<0.000399 U	<0.000392 U	<0.000391 U	<0.000391 U	<0.000398 U	<0.000399 U	<0.000394 U	<0.000397 U	<0.000396 U	<0.000396 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
Perfluorobutanoic acid (PFBA)	375-22-4	NS	NS	NS	mg/kg	<0.000798 U	<0.000781 U	<0.000797 U	<0.000784 U	<0.000781 U	<0.000782 U	<0.000796 U	<0.000798 U	<0.000789 U	<0.000794 U	<0.000792 U	<0.000792 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	0.000063 J	<0.000198 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	0.001	0.044	mg/kg	<0.000199 U	0.000344	<0.000199 U	0.000078 J	0.000195	<0.000195 U	0.000112 J	<0.0002 U	<0.000197 U	0.000103 J	**0.0012**	<0.000198 U
Perfluorooctanoic Acid (PFOA)	335-67-1	0.00066	0.0008	0.033	mg/kg	<0.000199 U	0.000078 J	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	0.000111 J	0.000214
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	NS	NS	mg/kg	<0.000399 U	<0.000391 U	<0.000399 U	<0.000392 U	<0.000391 U	<0.000391 U	<0.000398 U	<0.000399 U	<0.000394 U	<0.000397 U	<0.000396 U	<0.000396 U
Perfluoropentansulfonic Acid (PFPeS)	2706-91-4	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	NS	NS	mg/kg	<0.000199 U	<0.000195 U	<0.000199 U	<0.000196 U	<0.000195 U	<0.000195 U	<0.000199 U	<0.0002 U	<0.000197 U	<0.000198 U	<0.000198 U	<0.000198 U

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB38	SB38	SB38	SB39	SB40	SB41	SB42	SB43	SB44	SB45	SB46	SB47
					Sample Name	SB38_0-2	SB38_3-5	SB38_5-7	SB39_8-10	SB40_8-10	SB41_8-10	SB42_8-10	SB43_8-10	SB44_8-10	SB45_8-10	SB46_8-10	SB47_8-10
					Sample Date	05/18/2023	05/18/2023	05/18/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023
					Sample Depth	0-2	3-5	5-7	8-10	8-10	8-10	8-10	8-10	8-10	8-10	8-10	8-10
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																	
1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	NS	mg/kg	<0.00052 U	<0.00052 U	<0.00054 U	<0.00053 U	<0.00055 U	<0.00056 U	<0.00052 U	<0.00065 U	<0.00059 U	<0.00057 U	<0.00064 U	<0.00054 U
1,1,1-Trichloroethane	71-55-6	0.68	0.68	100	mg/kg	<0.00052 U	<0.00052 U	<0.00054 U	<0.00053 U	<0.00055 U	<0.00056 U	<0.00052 U	<0.00065 U	<0.00059 U	<0.00057 U	<0.00064 U	<0.00054 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	mg/kg	<0.00052 U	<0.00052 U	<0.00054 U	<0.00053 U	<0.00055 U	<0.00056 U	<0.00052 U	<0.00065 U	<0.00059 U	<0.00057 U	<0.00064 U	<0.00054 U
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 U	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
1,1-Dichloroethane	75-34-3	0.27	0.27	26	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 U	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
1,1-Dichloroethene	75-35-4	0.33	0.33	100	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 U	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
1,1-Dichloropropene	563-58-6	NS	NS	NS	mg/kg	<0.00052 U	<0.00052 U	<0.00054 U	<0.00053 U	<0.00055 U	<0.00056 U	<0.00052 U	<0.00065 U	<0.00059 U	<0.00057 U	<0.00064 U	<0.00054 U
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
1,2,3-Trichloropropane	96-18-4	NS	NS	NS	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
1,2,4,5-Tetramethylbenzene	95-93-2	NS	NS	NS	mg/kg	<0.0021 U	0.00028 J	<0.0022 U	0.018	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
1,2,4-Trimethylbenzene	95-63-6	**3.6**	3.6	52	mg/kg	<0.0021 U	0.0004 J	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	NS	NS	mg/kg	<0.0031 U	<0.0031 U	<0.0033 U	<0.0032 U	<0.0033 U	<0.0033 U	<0.0031 U	<0.0039 U	<0.0036 U	<0.0034 U	<0.0038 U	<0.0032 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	NS	NS	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 U	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
1,2-Dichloroethane	107-06-2	0.02	0.02	3.1	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 U	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
1,2-Dichloropropane	78-87-5	NS	NS	NS	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 U	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	**8.4**	8.4	52	mg/kg	<0.0021 U	0.00032 J	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
1,3-Dichloropropane	142-28-9	NS	NS	NS	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
1,4-Diethyl Benzene	105-05-5	NS	NS	NS	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<0.084 U	<0.084 U	<0.087 U	<0.084 U	<0.088 U	<0.089 U	<0.084 U	<0.1 U	<0.095 U	<0.092 U	<0.1 U	<0.087 U
2,2-Dichloropropane	594-20-7	NS	NS	NS	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
2-Chlorotoluene	95-49-8	NS	NS	NS	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
2-Hexanone (MBK)	591-78-6	NS	NS	NS	mg/kg	<0.01 U	<0.01 U	<0.011 U	<0.01 U	<0.011 U	<0.011 U	<0.01 U	<0.013 U	<0.012 U	<0.011 U	<0.013 U	<0.011 U
4-Chlorotoluene	106-43-4	NS	NS	NS	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
4-Ethyltoluene	622-96-8	NS	NS	NS	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
Acetone	67-64-1	**0.05**	0.05	100	mg/kg	<0.01 U	<0.01 U	<0.011 U	0.0098 J	<0.011 U	0.0059 J	0.0095 J	0.0079 J	0.0072 J	0.0082 J	<0.013 U	<0.011 U
Acrylonitrile	107-13-1	NS	NS	NS	mg/kg	<0.0042 U	<0.0042 U	<0.0044 U	<0.0042 U	<0.0044 U	<0.0044 U	<0.0042 U	<0.0052 U	<0.0047 U	<0.0046 U	<0.0051 U	<0.0043 U
Benzene	71-43-2	**0.06**	0.06	4.8	mg/kg	<0.00052 U	<0.00052 U	<0.00054 U	<0.00053 U	<0.00055 U	<0.00056 U	<0.00052 U	<0.00065 U	<0.00059 U	<0.00057 U	<0.00064 U	<0.00054 U
Bromobenzene	108-86-1	NS	NS	NS	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
Bromochloromethane	74-97-5	NS	NS	NS	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
Bromodichloromethane	75-27-4	NS	NS	NS	mg/kg	<0.00052 U	<0.00052 U	<0.00054 U	<0.00053 U	<0.00055 U	<0.00056 U	<0.00052 U	<0.00065 U	<0.00059 U	<0.00057 U	<0.00064 U	<0.00054 U
Bromoform	75-25-2	NS	NS	NS	mg/kg	<0.0042 U	<0.0042 U	<0.0044 U	<0.0042 UJ	<0.0044 U	<0.0044 U	<0.0042 U	<0.0052 U	<0.0047 U	<0.0046 U	<0.0051 U	<0.0043 U
Bromomethane	74-83-9	NS	NS	NS	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
Carbon Disulfide	75-15-0	NS	NS	NS	mg/kg	<0.01 U	<0.01 U	<0.011 U	<0.01 U	<0.011 U	<0.011 U	<0.01 U	<0.013 U	<0.012 U	<0.011 U	<0.013 U	<0.011 U
Carbon Tetrachloride	56-23-5	0.76	0.76	2.4	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 U	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
Chlorobenzene	108-90-7	1.1	1.1	100	mg/kg	<0.00052 U	<0.00052 U	<0.00054 U	<0.00053 U	<0.00055 U	<0.00056 U	<0.00052 U	<0.00065 U	<0.00059 U	<0.00057 U	<0.00064 U	<0.00054 U
Chloroethane	75-00-3	NS	NS	NS	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
Chloroform	67-66-3	0.37	0.37	49	mg/kg	<0.0016 U	<0.0016 U	<0.0016 U	<0.0016 U	<0.0016 U	<0.0017 U	<0.0016 U	<0.0019 U	<0.0018 U	<0.0017 U	<0.0019 U	<0.0016 U
Chloromethane	74-87-3	NS	NS	NS	mg/kg	<0.0042 U	<0.0042 U	<0.0044 U	<0.0042 U	<0.0044 U	<0.0044 U	<0.0042 U	<0.0052 U	<0.0047 U	<0.0046 U	<0.0051 U	<0.0043 U
Cis-1,2-Dichloroethene	156-59-2	0.25	0.25	100	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 U	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	mg/kg	<0.00052 U	<0.00052 U	<0.00054 U	<0.00053 U	<0.00055 U	<0.00056 U	<0.00052 U	<0.00065 U	<0.00059 U	<0.00057 U	<0.00064 U	<0.00054 U
Cymene	99-87-6	NS	NS	NS	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 U	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
Dibromochloromethane	124-48-1	NS	NS	NS	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 U	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
Dibromomethane	74-95-3	NS	NS	NS	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
Dichlorodifluoromethane	75-71-8	NS	NS	NS	mg/kg	<0.01 U	<0.01 U	<0.011 U	<0.01 U	<0.011 U	<0.011 U	<0.01 U	<0.013 U	<0.012 U	<0.011 U	<0.013 U	<0.011 U
Diethyl Ether (Ethyl Ether)	60-29-7	NS	NS	NS	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
Ethylbenzene	100-41-4	**1**	1	41	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 U	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.0042 U	<0.0042 U	<0.0044 U	<0.0042 U	<0.0044 U	<0.0044 U	<0.0042 U	<0.0052 U	<0.0047 U	<0.0046 U	<0.0051 U	<0.0043 U
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	mg/kg	<0.001 U	<0.001 U	<0.0011 U	0.0025 J	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
M,P-Xylene	179601-23-1	NS	NS	NS	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	<0.0021 U	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	0.12	100	mg/kg	<0.01 U	<0.01 U	<0.011 U	<0.01 U	<0.011 U	<0.011 U	<0.01 U	<0.013 U	<0.012 U	<0.011 U	<0.013 U	<0.011 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	NS	NS	mg/kg	<0.01 U	<0.01 U	<0.011 U	<0.01 U	<0.011 U	<0.011 U	<0.01 U	<0.013 U	<0.012 U	<0.011 U	<0.013 U	<0.011 U
Methylene Chloride	75-09-2	0.05	0.05	100	mg/kg	<0.0052 U	<0.0052 U	<0.0054 U	<0.0053 U	<0.0055 U	<0.0056 U	<0.0052 U	<0.0065 U	<0.0059 U	<0.0057 U	<0.0064 U	<0.0054 U
Naphthalene	91-20-3	**12**	12	100	mg/kg	<0.0042 U	0.11	<0.0044 U	<0.0042 U	<0.0044 U	<0.0044 U	<0.0042 U	<0.0052 U	<0.0047 U	<0.0046 U	<0.0051 U	<0.0043 U
n-Butylbenzene	104-51-8	**12**	12	100	mg/kg	<0.001 U	<0.001 U	<0.0011 U	0.00088 J	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
n-Propylbenzene	103-65-1	**3.9**	3.9	100	mg/kg	<0.001 U	<0.001 U	<0.0011 U	0.0025	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	NS	NS	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 UJ	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
Sec-Butylbenzene	135-98-8	11	11	100	mg/kg	<0.001 U	<0.001 U	<0.0011 U	0.0017	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
Styrene	100-42-5	NS	NS	NS	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 UJ	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
T-Butylbenzene	98-06-6	5.9	5.9	100	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	0.00016 J	<0.0022 U	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
Tert-Butyl Methyl Ether	1634-04-4	0.93	0.93	100	mg/kg	<0.0021 U	<0.0021 U	<0.0022 U	0.00037 J	0.0013 J	<0.0022 U	<0.0021 U	<0.0026 U	<0.0024 U	<0.0023 U	<0.0026 U	<0.0022 U
Tetrachloroethene (PCE)	127-18-4	**1.3**	1.3	19	mg/kg	<0.00052 U	<0.00052 U	<0.00054 U	<0.00053 U	<0.00055 U	<0.00056 U	<0.00052 U	<0.00065 U	<0.00059 U	<0.00057 U	<0.00064 U	<0.00054 U
Toluene	108-88-3	**0.7**	0.7	100	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 U	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	NS	NS	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 U	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
Total Xylenes	1330-20-7	**0.26**	1.6	100	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 U	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	NS	NS	NS	mg/kg	<0.00052 U	<0.00052 U	<0.00054 U	<0.00053 U	<0.00055 U	<0.00056 U	<0.00052 U	<0.00065 U	<0.00059 U	<0.00057 U	<0.00064 U	<0.00054 U
Trans-1,2-Dichloroethene	156-60-5	0.19	0.19	100	mg/kg	<0.0016 U	<0.0016 U	<0.0016 U	<0.0016 U	<0.0016 U	<0.0017 U	<0.0016 U	<0.0019 U	<0.0018 U	<0.0017 U	<0.0019 U	<0.0016 U
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 U	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	NS	NS	mg/kg	<0.0052 U	<0.0052 U	<0.0054 U	<0.0053 U	<0.0055 U	<0.0056 U	<0.0052 U	<0.0065 U	<0.0059 U	<0.0057 U	<0.0064 U	<0.0054 U
Trichloroethene (TCE)	79-01-6	0.47	0.47	21	mg/kg	<0.00052 U	<0.00052 U	<0.00054 U	<0.00053 U	<0.00055 U	<0.00056 U	<0.00052 U	<0.00065 U	<0.00059 U	<0.00057 U	<0.00064 U	<0.00054 U
Trichlorofluoromethane	75-69-4	NS	NS	NS	mg/kg	<0.0042 U	<0.0042 U	<0.0044 U	<0.0042 U	<0.0044 U	<0.0044 U	<0.0042 U	<0.0052 U	<0.0047 U	<0.0046 U	<0.0051 U	<0.0043 U
Vinyl Acetate	108-05-4	NS	NS	NS	mg/kg	<0.01 U	<0.01 U	<0.011 U	<0.01 U	<0.011 U	<0.011 U	<0.01 U	<0.013 U	<0.012 U	<0.011 U	<0.013 U	<0.011 U
Vinyl Chloride	75-01-4	0.02	0.02	0.9	mg/kg	<0.001 U	<0.001 U	<0.0011 U	<0.001 U	<0.0011 U	<0.0011 U	<0.001 U	<0.0013 U	<0.0012 U	<0.0011 U	<0.0013 U	<0.0011 U
Total VOCs	TOTAL VOCS	NS	NS	NS	mg/kg	ND	0.111	ND	0.03591	0.0013	0.0059	0.0095	0.0079	0.0072	0.0082	ND	ND

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB38	SB38	SB38	SB39	SB40	SB41	SB42	SB43	SB44	SB45	SB46	SB47
					Sample Name	SB38_0-2	SB38_3-5	SB38_5-7	SB39_8-10	SB40_8-10	SB41_8-10	SB42_8-10	SB43_8-10	SB44_8-10	SB45_8-10	SB46_8-10	SB47_8-10
					Sample Date	05/18/2023	05/18/2023	05/18/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023
					Sample Depth	0-2	3-5	5-7	8-10	8-10	8-10	8-10	8-10	8-10	8-10	8-10	8-10
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																	
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<0.13 U	<0.13 U	<0.027 U	<0.029 U	<0.029 U	<0.029 U	<0.03 U	<0.03 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U
2,4,5-Trichlorophenol	95-95-4	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	mg/kg	<0.52 U	<0.54 U	<0.11 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U
2,4-Dichlorophenol	120-83-2	NS	NS	NS	mg/kg	<0.78 U	<0.81 U	<0.16 U	<0.18 U	<0.17 U	<0.17 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.18 U
2,4-Dimethylphenol	105-67-9	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
2,4-Dinitrophenol	51-28-5	NS	NS	NS	mg/kg	<4.2 U	<4.3 U	<0.87 U	<0.94 U	<0.93 U	<0.93 U	<0.96 U	<0.97 U	<0.94 U	<0.94 U	<0.93 U	<0.94 U
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
2,6-Dinitrotoluene	606-20-2	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
2-Chloronaphthalene	91-58-7	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
2-Chlorophenol	95-57-8	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
2-Methylnaphthalene	91-57-6	NS	NS	NS	mg/kg	<1 U	1.4	<0.22 U	<0.24 U	<0.23 U	<0.23 U	<0.24 U	<0.24 U	<0.23 U	<0.23 U	<0.23 U	<0.24 U
2-Methylphenol (o-Cresol)	95-48-7	0.33	0.33	100	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
2-Nitroaniline	88-74-4	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
2-Nitrophenol	88-75-5	NS	NS	NS	mg/kg	<1.9 U	<1.9 U	<0.39 U	<0.42 U	<0.42 U	<0.42 U	<0.43 U	<0.44 U	<0.42 U	<0.42 U	<0.42 U	<0.42 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	0.33	100	mg/kg	<1.2 U	0.2 J	<0.26 U	<0.28 U	<0.28 U	<0.28 U	<0.29 U	<0.29 U	<0.28 U	<0.28 U	<0.28 U	<0.28 U
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
3-Nitroaniline	99-09-2	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	NS	NS	mg/kg	<2.3 U	<2.3 U	<0.47 U	<0.51 U	<0.5 U	<0.5 U	<0.52 U	<0.52 U	<0.51 U	<0.51 U	<0.5 U	<0.51 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
4-Chloro-3-Methylphenol	59-50-7	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
4-Chloroaniline	106-47-8	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
4-Nitroaniline	100-01-6	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
4-Nitrophenol	100-02-7	NS	NS	NS	mg/kg	<1.2 U	<1.2 U	<0.25 U	<0.28 U	<0.27 U	<0.27 U	<0.28 U	<0.28 U	<0.27 U	<0.27 U	<0.27 U	<0.27 U
Acenaphthene	83-32-9	20	98	100	mg/kg	<0.7 U	6.5	<0.14 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U
Acenaphthylene	208-96-8	100	107	100	mg/kg	<0.7 U	4	<0.14 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U
Acetophenone	98-86-2	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
Anthracene	120-12-7	100	1000	100	mg/kg	<0.52 U	21	<0.11 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U
Benzo(a)anthracene	56-55-3	**1**	1	1	mg/kg	0.15 J	**91**	0.031 J	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U
Benzo(a)pyrene	50-32-8	**1**	22	1	mg/kg	<0.7 U	**92**	<0.14 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U
Benzo(b)fluoranthene	205-99-2	**1**	1.7	1	mg/kg	0.22 J	**96**	<0.11 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U
Benzo(g,h,i)Perylene	191-24-2	100	1000	100	mg/kg	0.16 J	50	<0.14 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U
Benzo(k)fluoranthene	207-08-9	**0.8**	1.7	3.9	mg/kg	<0.52 U	**25**	<0.11 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U
Benzoic Acid	65-85-0	NS	NS	NS	mg/kg	<2.8 U	<2.9 U	<0.59 U	<0.64 U	<0.63 U	<0.63 U	<0.65 U	<0.66 U	<0.63 U	<0.63 U	<0.63 U	<0.63 U
Benzyl Alcohol	100-51-6	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
Benzyl Butyl Phthalate	85-68-7	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
Biphenyl (Diphenyl)	92-52-4	NS	NS	NS	mg/kg	<2 U	0.55 J	<0.41 U	<0.45 U	<0.44 U	<0.44 U	<0.46 U	<0.46 U	<0.44 U	<0.45 U	<0.44 U	<0.45 U
Bis(2-chloroethoxy) methane	111-91-1	NS	NS	NS	mg/kg	<0.94 U	<0.97 U	<0.2 U	<0.21 U	<0.21 U	<0.21 U	<0.22 U	<0.22 U	<0.21 U	<0.21 U	<0.21 U	<0.21 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	NS	NS	mg/kg	<0.78 U	<0.81 U	<0.16 U	<0.18 U	<0.17 U	<0.17 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.18 U
Bis(2-chloroisopropyl) ether	108-60-1	NS	NS	NS	mg/kg	<1 U	<1.1 U	<0.22 U	<0.24 U	<0.23 U	<0.23 U	<0.24 U	<0.24 U	<0.23 U	<0.23 U	<0.23 U	<0.24 U
Bis(2-ethylhexyl) phthalate	117-81-7	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
Carbazole	86-74-8	NS	NS	NS	mg/kg	<0.87 U	2.7	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
Chrysene	218-01-9	**1**	1	3.9	mg/kg	0.15 J	**87**	0.027 J	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U
Dibenz(a,h)anthracene	53-70-3	**0.33**	1000	0.33	mg/kg	<0.52 U	**10**	<0.11 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U
Dibenzofuran	132-64-9	7	210	59	mg/kg	<0.87 U	2.9	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
Dibutyl phthalate	84-74-2	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
Diethyl phthalate	84-66-2	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
Dimethyl phthalate	131-11-3	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
Dioctyl phthalate	117-84-0	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
Fluoranthene	206-44-0	**100**	1000	100	mg/kg	0.27 J	**160**	0.048 J	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U
Fluorene	86-73-7	30	386	100	mg/kg	<0.87 U	5.9	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
Hexachlorobenzene	118-74-1	0.33	3.2	1.2	mg/kg	<0.52 U	<0.54 U	<0.11 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	mg/kg	<2.5 U	<2.6 U	<0.52 U	<0.56 U	<0.55 U	<0.56 U	<0.57 U	<0.58 U	<0.56 U	<0.56 U	<0.56 U	<0.56 U
Hexachloroethane	67-72-1	NS	NS	NS	mg/kg	<0.7 U	<0.72 U	<0.14 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	8.2	0.5	mg/kg	0.15 J	**58**	<0.14 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U
Isophorone	78-59-1	NS	NS	NS	mg/kg	<0.78 U	<0.81 U	<0.16 U	<0.18 U	<0.17 U	<0.17 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.18 U
Naphthalene	91-20-3	**12**	12	100	mg/kg	<0.87 U	3	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	0.03 J	<0.2 U	<0.2 U	<0.19 U	<0.2 U
Nitrobenzene	98-95-3	NS	NS	NS	mg/kg	<0.78 U	<0.81 U	<0.16 U	<0.18 U	<0.17 U	<0.17 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.18 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	NS	NS	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
n-Nitrosodiphenylamine	86-30-6	NS	NS	NS	mg/kg	<0.7 U	<0.72 U	<0.14 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U
Pentachlorophenol	87-86-5	0.8	0.8	6.7	mg/kg	<0.7 U	<0.72 U	<0.14 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U	<0.16 U
Phenanthrene	85-01-8	100	1000	100	mg/kg	0.12 J	86	0.029 J	<0.12 U	<0.12 U	<0.12 U	<0.12 U	0.037 J	<0.12 U	<0.12 U	<0.12 U	<0.12 U
Phenol	108-95-2	0.33	0.33	100	mg/kg	<0.87 U	<0.9 U	<0.18 U	<0.2 U	<0.19 U	<0.19 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.19 U	<0.2 U
Pyrene	129-00-0	**100**	1000	100	mg/kg	0.27 J	**190**	0.048 J	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB38	SB38	SB38	SB39	SB40	SB41	SB42	SB43	SB44	SB45	SB46	SB47
					Sample Name	SB38_0-2	SB38_3-5	SB38_5-7	SB39_8-10	SB40_8-10	SB41_8-10	SB42_8-10	SB43_8-10	SB44_8-10	SB45_8-10	SB46_8-10	SB47_8-10
					Sample Date	05/18/2023	05/18/2023	05/18/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023
					Sample Depth	0-2	3-5	5-7	8-10	8-10	8-10	8-10	8-10	8-10	8-10	8-10	8-10
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																	
4,4'-DDD	72-54-8	**0.0033**	14	13	mg/kg	0.000999 J	**0.0108**	<0.00176 U	NA	NA	NA	NA	NA	NA	NA	<0.00183 U	<0.00183 U
4,4'-DDE	72-55-9	**0.0033**	17	8.9	mg/kg	0.00174	**0.0136 J**	0.000784 J	NA	NA	NA	NA	NA	NA	NA	<0.00183 U	<0.00183 U
4,4'-DDT	50-29-3	**0.0033**	136	7.9	mg/kg	<0.00163 U	**0.123 J**	<0.00176 U	NA	NA	NA	NA	NA	NA	NA	<0.00183 U	<0.00183 U
Aldrin	309-00-2	**0.005**	0.19	0.097	mg/kg	**0.0162**	<0.00168 U	<0.00176 U	NA	NA	NA	NA	NA	NA	NA	<0.00183 U	<0.00183 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	0.02	0.48	mg/kg	<0.00068 U	<0.0007 U	<0.000736 U	NA	NA	NA	NA	NA	NA	NA	<0.000763 U	<0.000761 U
Alpha Chlordane	5103-71-9	**0.094**	2.9	4.2	mg/kg	0.00503 J	0.0102 J	<0.00221 U	NA	NA	NA	NA	NA	NA	NA	<0.00229 U	<0.00228 U
Alpha Endosulfan	959-98-8	2.4	102	24	mg/kg	<0.00163 U	<0.00168 U	<0.00176 U	NA	NA	NA	NA	NA	NA	NA	<0.00183 U	<0.00183 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	0.09	0.36	mg/kg	<0.00163 U	<0.00168 U	<0.00176 U	NA	NA	NA	NA	NA	NA	NA	<0.00183 U	<0.00183 U
Beta Endosulfan	33213-65-9	2.4	102	24	mg/kg	<0.00163 U	<0.00168 U	<0.00176 U	NA	NA	NA	NA	NA	NA	NA	<0.00183 U	<0.00183 U
Chlordane (alpha and gamma)	57-74-9	NS	NS	NS	mg/kg	0.0546	0.13 J	<0.0147 U	NA	NA	NA	NA	NA	NA	NA	<0.0152 U	<0.0152 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	0.25	100	mg/kg	<0.00163 U	0.000663 J	<0.00176 U	NA	NA	NA	NA	NA	NA	NA	<0.00183 U	<0.00183 U
Dieldrin	60-57-1	**0.005**	0.1	0.2	mg/kg	0.00391	0.0034 J	<0.0011 U	NA	NA	NA	NA	NA	NA	NA	<0.00114 U	<0.00114 U
Endosulfan Sulfate	1031-07-8	2.4	1000	24	mg/kg	<0.00068 U	<0.0007 U	<0.000736 U	NA	NA	NA	NA	NA	NA	NA	<0.000763 U	<0.000761 U
Endrin	72-20-8	0.014	0.06	11	mg/kg	<0.00068 U	<0.0007 U	<0.000736 U	NA	NA	NA	NA	NA	NA	NA	<0.000763 U	<0.000761 U
Endrin Aldehyde	7421-93-4	NS	NS	NS	mg/kg	<0.00204 U	<0.0021 U	<0.00221 U	NA	NA	NA	NA	NA	NA	NA	<0.00229 U	<0.00228 U
Endrin Ketone	53494-70-5	NS	NS	NS	mg/kg	<0.00163 U	<0.00168 U	<0.00176 U	NA	NA	NA	NA	NA	NA	NA	<0.00183 U	<0.00183 U
Gamma Bhc (Lindane)	58-89-9	0.1	0.1	1.3	mg/kg	<0.00068 U	<0.0007 U	<0.000736 U	NA	NA	NA	NA	NA	NA	NA	<0.000763 U	<0.000761 U
Gamma Chlordane (Trans)	5103-74-2	NS	NS	NS	mg/kg	0.00726	0.00814	<0.00221 U	NA	NA	NA	NA	NA	NA	NA	<0.00229 U	<0.00228 U
Heptachlor	76-44-8	0.042	0.38	2.1	mg/kg	<0.000816 U	0.000556 J	<0.000883 U	NA	NA	NA	NA	NA	NA	NA	<0.000915 U	<0.000913 U
Heptachlor Epoxide	1024-57-3	NS	NS	NS	mg/kg	<0.00306 U	<0.00315 U	<0.00331 U	NA	NA	NA	NA	NA	NA	NA	<0.00343 U	<0.00342 U
Methoxychlor	72-43-5	NS	NS	NS	mg/kg	<0.00306 U	<0.00315 U	<0.00331 U	NA	NA	NA	NA	NA	NA	NA	<0.00343 U	<0.00342 U
Toxaphene	8001-35-2	NS	NS	NS	mg/kg	<0.0306 U	<0.0315 U	<0.0331 U	NA	NA	NA	NA	NA	NA	NA	<0.0343 U	<0.0342 U
Herbicides																	
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	NS	NS	mg/kg	<0.173 U	<0.176 U	<0.185 U	NA	NA	NA	NA	NA	NA	NA	<0.196 U	<0.198 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	NS	NS	mg/kg	<0.173 U	<0.176 U	<0.185 U	NA	NA	NA	NA	NA	NA	NA	<0.196 U	<0.198 U
Silvex (2,4,5-Tp)	93-72-1	3.8	3.8	100	mg/kg	<0.173 U	<0.176 U	<0.185 U	NA	NA	NA	NA	NA	NA	NA	<0.196 U	<0.198 U
Polychlorinated Biphenyl																	
PCB-1016 (Aroclor 1016)	12674-11-2	NS	NS	NS	mg/kg	<0.0516 U	<0.0492 U	<0.0533 U	NA	NA	NA	NA	NA	NA	NA	<0.0566 U	<0.055 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	NS	NS	mg/kg	<0.0516 U	<0.0492 U	<0.0533 U	NA	NA	NA	NA	NA	NA	NA	<0.0566 U	<0.055 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	NS	NS	mg/kg	<0.0516 U	<0.0492 U	<0.0533 U	NA	NA	NA	NA	NA	NA	NA	<0.0566 U	<0.055 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	NS	NS	mg/kg	<0.0516 U	<0.0492 U	<0.0533 U	NA	NA	NA	NA	NA	NA	NA	<0.0566 U	<0.055 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	NS	NS	mg/kg	<0.0516 U	<0.0492 U	<0.0533 U	NA	NA	NA	NA	NA	NA	NA	<0.0566 U	<0.055 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	NS	NS	mg/kg	<0.0516 U	<0.0492 U	<0.0533 U	NA	NA	NA	NA	NA	NA	NA	<0.0566 U	<0.055 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	NS	NS	mg/kg	<0.0516 U	0.0151 J	<0.0533 U	NA	NA	NA	NA	NA	NA	NA	<0.0566 U	<0.055 U
PCB-1262 (Aroclor 1262)	37324-23-5	NS	NS	NS	mg/kg	<0.0516 U	<0.0492 U	<0.0533 U	NA	NA	NA	NA	NA	NA	NA	<0.0566 U	<0.055 U
PCB-1268 (Aroclor 1268)	11100-14-4	NS	NS	NS	mg/kg	<0.0516 U	0.00827 J	<0.0533 U	NA	NA	NA	NA	NA	NA	NA	<0.0566 U	<0.055 U
Total PCBs	1336-36-3	0.1	3.2	1	mg/kg	<0.0516 U	0.0234 J	<0.0533 U	NA	NA	NA	NA	NA	NA	NA	<0.0566 U	<0.055 U
Metals																	
Aluminum	7429-90-5	NS	NS	NS	mg/kg	4,440	2,480	413	NA	NA	NA	NA	NA	NA	NA	488	455
Antimony	7440-36-0	NS	NS	NS	mg/kg	<4.08 U	<4.13 U	<4.3 U	NA	NA	NA	NA	NA	NA	NA	<4.53 U	<4.61 U
Arsenic	7440-38-2	13	16	16	mg/kg	2.94	1.7	0.554 J	NA	NA	NA	NA	NA	NA	NA	0.336 J	0.286 J
Barium	7440-39-3	**350**	820	400	mg/kg	34.8	**381**	4.04	NA	NA	NA	NA	NA	NA	NA	2.64	2.83
Beryllium	7440-41-7	7.2	47	72	mg/kg	0.052 J	0.042 J	<0.43 U	NA	NA	NA	NA	NA	NA	NA	0.062 J	0.052 J
Cadmium	7440-43-9	2.5	7.5	4.3	mg/kg	0.173 J	0.356 J	<0.861 U	NA	NA	NA	NA	NA	NA	NA	<0.905 U	<0.921 U
Calcium	7440-70-2	NS	NS	NS	mg/kg	34,600	20,400	195	NA	NA	NA	NA	NA	NA	NA	221	234
Chromium, Hexavalent	18540-29-9	**1**	19	110	mg/kg	0.179 J	0.302 J	<0.897 U	NA	NA	NA	NA	NA	NA	NA	0.214 J	<0.958 U
Chromium, Total	7440-47-3	NS	NS	NS	mg/kg	9.67	10	2.04	NA	NA	NA	NA	NA	NA	NA	2.46	2.41
Chromium, Trivalent	16065-83-1	**30**	NS	180	mg/kg	9.49 J	9.7 J	2.04	NA	NA	NA	NA	NA	NA	NA	2.25 J	2.41
Cobalt	7440-48-4	NS	NS	NS	mg/kg	4.63	2.35	0.31 J	NA	NA	NA	NA	NA	NA	NA	0.363 J	0.4 J
Copper	7440-50-8	**50**	1720	270	mg/kg	31	19.2	1.09	NA	NA	NA	NA	NA	NA	NA	0.878 J	0.59 J
Cyanide	57-12-5	27	40	27	mg/kg	<1 UJ	<1 UJ	<1.1 UJ	NA	NA	NA	NA	NA	NA	NA	<1.1 U	<1.1 UJ
Iron	7439-89-6	NS	NS	NS	mg/kg	9,380	5,680	1,010	NA	NA	NA	NA	NA	NA	NA	891	805
Lead	7439-92-1	**63**	450	400	mg/kg	43.6	**243**	1.07 J	NA	NA	NA	NA	NA	NA	NA	1.08 J	1.06 J
Magnesium	7439-95-4	NS	NS	NS	mg/kg	12,400	5,020	184	NA	NA	NA	NA	NA	NA	NA	227	200
Manganese	7439-96-5	1600	2000	2000	mg/kg	137	84.8	14.4	NA	NA	NA	NA	NA	NA	NA	9.03	8.42
Mercury	7439-97-6	**0.18**	0.73	0.81	mg/kg	0.073	0.081	<0.072 U	NA	NA	NA	NA	NA	NA	NA	<0.075 U	<0.078 U
Nickel	7440-02-0	30	130	310	mg/kg	10.1	8.25	1.18 J	NA	NA	NA	NA	NA	NA	NA	1.28 J	1.2 J
Potassium	7440-09-7	NS	NS	NS	mg/kg	664	387	<215 U	NA	NA	NA	NA	NA	NA	NA	150 J	124 J
Selenium	7782-49-2	3.9	4	180	mg/kg	<1.63 U	<1.65 U	<1.72 U	NA	NA	NA	NA	NA	NA	NA	<1.81 U	<1.84 U
Silver	7440-22-4	2	8.3	180	mg/kg	<0.408 U	<0.413 U	<0.43 U	NA	NA	NA	NA	NA	NA	NA	<0.453 U	<0.461 U
Sodium	7440-23-5	NS	NS	NS	mg/kg	309	<165 U	<172 U	NA	NA	NA	NA	NA	NA	NA	<181 U	<184 U
Thallium	7440-28-0	NS	NS	NS	mg/kg	<1.63 U	<1.65 U	<1.72 U	NA	NA	NA	NA	NA	NA	NA	<1.81 U	<1.84 U
Vanadium	7440-62-2	NS	NS	NS	mg/kg	28.1	12.9	2.2	NA	NA	NA	NA	NA	NA	NA	1.86	2.19
Zinc	7440-66-6	**109**	2480	10000	mg/kg	56.7	**200**	15.2	NA	NA	NA	NA	NA	NA	NA	16	11.3
General Chemistry																	
Total Solids	TSOLID	NS	NS	NS	Percent	95	92.6	89.2	84.3	84	84.5	81.4	80.4	83	84.2	84	83.5

Table 1A
Remedial Investigation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB38	SB38	SB38	SB39	SB40	SB41	SB42	SB43	SB44	SB45	SB46	SB47
					Sample Name	SB38_0-2	SB38_3-5	SB38_5-7	SB39_8-10	SB40_8-10	SB41_8-10	SB42_8-10	SB43_8-10	SB44_8-10	SB45_8-10	SB46_8-10	SB47_8-10
					Sample Date	05/18/2023	05/18/2023	05/18/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023	06/01/2023
					Sample Depth	0-2	3-5	5-7	8-10	8-10	8-10	8-10	8-10	8-10	8-10	8-10	8-10
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances																	
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	763051-92-9	NS	NS	NS	mg/kg	<0.000794 U	<0.000797 U	<0.000799 U	NA	NA	NA	NA	NA	NA	NA	<0.000799 U	<0.000781 U
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2FTS)	39108-34-4	NS	NS	NS	mg/kg	<0.000794 U	<0.000797 UJ	<0.000799 U	NA	NA	NA	NA	NA	NA	NA	<0.000799 U	<0.000781 U
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	NS	NS	mg/kg	<0.000794 U	<0.000797 U	<0.000799 U	NA	NA	NA	NA	NA	NA	NA	<0.000799 U	<0.000781 U
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2FTS)	27619-97-2	NS	NS	NS	mg/kg	<0.000794 U	<0.000797 U	<0.000799 U	NA	NA	NA	NA	NA	NA	NA	<0.000799 U	<0.000781 U
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3FTCA)	914637-49-3	NS	NS	NS	mg/kg	<0.00496 U	<0.00498 U	<0.005 U	NA	NA	NA	NA	NA	NA	NA	<0.00499 U	<0.00488 U
3-Perfluoroheptyl Propanoic Acid (7:3FTCA)	812-70-4	NS	NS	NS	mg/kg	<0.00496 U	<0.00498 U	<0.005 U	NA	NA	NA	NA	NA	NA	NA	<0.00499 U	<0.00488 U
3-Perfluoropropyl Propanoic Acid (3:3FTCA)	356-02-5	NS	NS	NS	mg/kg	<0.000993 U	<0.000996 U	<0.000999 U	NA	NA	NA	NA	NA	NA	NA	<0.000999 U	<0.000977 U
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	NS	NS	NS	mg/kg	<0.000794 U	<0.000797 U	<0.000799 U	NA	NA	NA	NA	NA	NA	NA	<0.000799 U	<0.000781 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid	756426-58-1	NS	NS	NS	mg/kg	<0.000794 U	<0.000797 U	<0.000799 U	NA	NA	NA	NA	NA	NA	NA	<0.000799 U	<0.000781 U
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	NS	NS	mg/kg	<0.000794 U	<0.000797 U	<0.000799 U	NA	NA	NA	NA	NA	NA	NA	<0.000799 U	<0.000781 U
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 UJ	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	NS	NS	mg/kg	<0.00199 U	<0.00199 U	<0.002 U	NA	NA	NA	NA	NA	NA	NA	<0.002 U	<0.00195 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA	2355-31-9	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 UJ	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	NS	NS	mg/kg	<0.00199 U	<0.00199 U	<0.002 U	NA	NA	NA	NA	NA	NA	NA	<0.002 U	<0.00195 U
Nonafluoro-3,6-dioxaheptanoic acid	151772-58-6	NS	NS	NS	mg/kg	<0.000397 U	<0.000398 U	<0.0004 U	NA	NA	NA	NA	NA	NA	NA	<0.000399 U	<0.000391 U
Perfluoro(2-ethoxyethane)sulfonic acid	113507-82-7	NS	NS	NS	mg/kg	<0.000397 U	<0.000398 U	<0.0004 U	NA	NA	NA	NA	NA	NA	NA	<0.000399 U	<0.000391 U
Perfluoro-3-methoxypropanoic acid	377-73-1	NS	NS	NS	mg/kg	<0.000397 U	<0.000398 U	<0.0004 U	NA	NA	NA	NA	NA	NA	NA	<0.000399 U	<0.000391 U
Perfluoro-4-methoxybutanoic acid	863090-89-5	NS	NS	NS	mg/kg	<0.000397 U	<0.000398 U	<0.0004 U	NA	NA	NA	NA	NA	NA	NA	<0.000399 U	<0.000391 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
Perfluorobutanoic acid (PFBA)	375-22-4	NS	NS	NS	mg/kg	<0.000794 U	<0.000797 U	<0.000799 U	NA	NA	NA	NA	NA	NA	NA	<0.000799 U	<0.000781 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	0.001	0.044	mg/kg	0.000079 J	0.000869	0.00016 J	NA	NA	NA	NA	NA	NA	NA	0.000096 J	<0.000195 U
Perfluorooctanoic Acid (PFOA)	335-67-1	0.00066	0.0008	0.033	mg/kg	<0.000199 U	0.00008 J	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	NS	NS	mg/kg	<0.000397 U	<0.000398 U	<0.0004 U	NA	NA	NA	NA	NA	NA	NA	<0.000399 U	<0.000391 U
Perfluoropentansulfonic Acid (PFPeS)	2706-91-4	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	NS	NS	mg/kg	<0.000199 U	<0.000199 U	<0.0002 U	NA	NA	NA	NA	NA	NA	NA	<0.0002 U	<0.000195 U

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Notes:

CAS - Chemical Abstract Service
NS - No standard
mg/kg - milligram per kilogram
NA - Not analyzed
RL - Reporting limit
<RL - Not detected

Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 of the Official Compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use, Protection of Groundwater, and Restricted Use Restricted-Residential Soil Cleanup Objectives (SCO).

Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Part 375 Remedial Programs Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS) Unrestricted Use, Restricted Use Restricted-Residential, and Protection of Groundwater Guidance Values (April 2023).

Criterion comparisons for 3- & 4-methylphenol (m&p cresol) are provided for reference. Promulgated SCOs are for 3-methylphenol (m-cresol) and 4-methylphenol (p-cresol).

Qualifiers:

J - The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
UJ - The analyte was not detected at a level greater than or equal to the RL; however, the reported RL is approximate and may be inaccurate or imprecise.
U - The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the RL or the sample concentration for results impacted by blank contamination.

Exceedance Summary:

10 - Result exceeds Unrestricted Use SCOs
10 - Result exceeds Protection of Groundwater SCOs
10 - Result exceeds Restricted Use Restricted-Residential SCOs

Table 1B
Remedial Investigation Soil Sample Analytical Results - Petroleum Impacts Delineation
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB35_E2	SB35_E3	SB35_E5	SB35_E6	SB35_N1	SB35_N2	SB35_N2	SB35_N3	SB35_SW1	SB35_SW1	SB35_SW1	SB35_SW2
					Sample Name	SB35_E2_8-10	SB35_E3_12-14	SB35_E5_8-10	SB35_E6_14-16	SB35_N1_8-10	SB35_N2_8-10	SB35_N2_14-16	SB35_N3_8-10	SB35_SW1_8-10	SBDUP02_052423	SB35_SW1_10-12	SB35_SW2_7-9
					Sample Date	05/23/2023	05/23/2023	05/24/2023	05/24/2023	05/23/2023	05/23/2023	05/23/2023	05/30/2023	05/24/2023	05/24/2023	05/24/2023	05/30/2023
					Sample Depth	8-10	12-14	8-10	14-16	8-10	8-10	14-16	8-10	8-10	8-10	10-12	7-9
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																	
1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	NS	mg/kg	<0.35 U	<0.033 U	<0.034 U	<0.00065 U	<0.17 U	<0.00067 U	<0.00054 U	<0.00065 U	<0.00056 U	<0.00062 U	<0.00076 U	<0.00053 U
1,1,1-Trichloroethane	71-55-6	0.68	0.68	100	mg/kg	<0.35 U	<0.033 U	<0.034 U	<0.00065 U	<0.17 U	<0.00067 U	<0.00054 U	<0.00065 U	<0.00056 U	<0.00062 U	<0.00076 U	<0.00053 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	mg/kg	<0.35 U	<0.033 U	<0.034 UJ	<0.00065 UJ	<0.17 U	<0.00067 U	<0.00054 U	<0.00065 U	<0.00056 U	<0.00062 UJ	<0.00076 U	<0.00053 U
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	mg/kg	<0.7 U	<0.066 U	<0.069 U	<0.0013 U	<0.34 U	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U
1,1-Dichloroethane	75-34-3	0.27	0.27	26	mg/kg	<0.7 U	<0.066 U	<0.069 U	<0.0013 U	<0.34 U	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U
1,1-Dichloroethene	75-35-4	0.33	0.33	100	mg/kg	<0.7 U	<0.066 U	<0.069 U	<0.0013 U	<0.34 U	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U
1,1-Dichloropropene	563-58-6	NS	NS	NS	mg/kg	<0.35 U	<0.033 U	<0.034 U	<0.00065 U	<0.17 U	<0.00067 U	<0.00054 U	<0.00065 U	<0.00056 U	<0.00062 U	<0.00076 U	<0.00053 U
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	mg/kg	<1.4 U	<0.13 U	<0.14 UJ	<0.0026 UJ	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 UJ	<0.003 U	<0.0021 U
1,2,3-Trichloropropane	96-18-4	NS	NS	NS	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	<0.0021 U
1,2,4,5-Tetramethylbenzene	95-93-2	NS	NS	NS	mg/kg	75	0.55	2	<0.0026 U	37	0.00059 J	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	1.8 J
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	<0.0021 U
1,2,4-Trimethylbenzene	95-63-6	**3.6**	3.6	52	mg/kg	**490**	**3.8**	2.4	<0.0026 U	**230**	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	2.7 J
1,2-Dibromo-3-Chloropropane	96-12-8	NS	NS	NS	mg/kg	<2.1 U	<0.2 U	<0.2 UJ	<0.0039 UJ	<1 U	<0.004 U	<0.0032 U	<0.0039 U	<0.0034 U	<0.0037 UJ	<0.0045 U	<0.0032 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	NS	NS	mg/kg	<0.7 U	<0.066 U	<0.069 U	<0.0013 U	<0.34 U	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	<0.0021 U
1,2-Dichloroethane	107-06-2	0.02	0.02	3.1	mg/kg	<0.7 U	<0.066 U	<0.069 U	<0.0013 U	<0.34 U	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U
1,2-Dichloropropane	78-87-5	NS	NS	NS	mg/kg	<0.7 U	<0.066 U	<0.069 U	<0.0013 U	<0.34 U	<0.0013 U	<0.0011 U	<0.0013 U	0.00027 J	<0.0012 U	<0.0015 U	<0.001 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	**8.4**	8.4	52	mg/kg	**130**	1.2	0.89	<0.0026 U	**65**	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	0.63 J
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	<0.0021 U
1,3-Dichloropropane	142-28-9	NS	NS	NS	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	<0.0021 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	<0.0021 U
1,4-Diethyl Benzene	105-05-5	NS	NS	NS	mg/kg	280	1.6	6.8	<0.0026 U	120	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	0.28 J
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<56 U	<5.3 U	<5.5 U	<0.1 U	<27 U	<0.11 U	<0.087 U	<0.1 U	<0.089 U	<0.099 U	<0.12 U	<0.084 U
2,2-Dichloropropane	594-20-7	NS	NS	NS	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	<0.0021 U
2-Chlorotoluene	95-49-8	NS	NS	NS	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	<0.0021 U
2-Hexanone (MBK)	591-78-6	NS	NS	NS	mg/kg	<7 U	<0.66 U	<0.69 UJ	<0.013 UJ	<3.4 U	<0.013 U	<0.011 U	<0.013 UJ	<0.011 U	<0.012 UJ	<0.015 U	<0.01 UJ
4-Chlorotoluene	106-43-4	NS	NS	NS	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	<0.0021 U
4-Ethyltoluene	622-96-8	NS	NS	NS	mg/kg	320	2.9	1.9	<0.0026 U	160	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	1.3 J
Acetone	67-64-1	**0.05**	0.05	100	mg/kg	<7 U	<0.66 U	<0.69 U	<0.013 U	<3.4 U	0.016	<0.011 U	0.019	0.0073 J	<0.012 U	<0.015 U	**0.11 J**
Acrylonitrile	107-13-1	NS	NS	NS	mg/kg	<2.8 U	<0.26 U	<0.27 U	<0.0052 U	<1.4 U	<0.0054 U	<0.0043 U	<0.0052 U	<0.0045 U	<0.005 U	<0.006 U	<0.0042 U
Benzene	71-43-2	**0.06**	0.06	4.8	mg/kg	<0.35 U	<0.033 U	**0.088**	<0.00065 U	<0.17 U	<0.00067 U	<0.00054 U	<0.00065 U	<0.00056 U	<0.00062 U	<0.00076 U	<0.00053 U
Bromobenzene	108-86-1	NS	NS	NS	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	<0.0021 U
Bromochloromethane	74-97-5	NS	NS	NS	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	<0.0021 U
Bromodichloromethane	75-27-4	NS	NS	NS	mg/kg	<0.35 U	<0.033 U	<0.034 U	<0.00065 U	<0.17 U	<0.00067 U	<0.00054 U	<0.00065 U	<0.00056 U	<0.00062 U	<0.00076 U	<0.00053 U
Bromoform	75-25-2	NS	NS	NS	mg/kg	<2.8 U	<0.26 U	<0.27 U	<0.0052 U	<1.4 U	<0.0054 U	<0.0043 U	<0.0052 U	<0.0045 U	<0.005 U	<0.006 U	<0.0042 U
Bromomethane	74-83-9	NS	NS	NS	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	<0.0021 U
Carbon Disulfide	75-15-0	NS	NS	NS	mg/kg	<7 U	<0.66 U	<0.69 U	<0.013 U	<3.4 U	<0.013 U	0.0056 J	<0.013 U	<0.011 U	<0.012 U	<0.015 U	<0.01 U
Carbon Tetrachloride	56-23-5	0.76	0.76	2.4	mg/kg	<0.7 U	<0.066 U	<0.069 U	<0.0013 U	<0.34 U	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U
Chlorobenzene	108-90-7	1.1	1.1	100	mg/kg	<0.35 U	<0.033 U	<0.034 U	<0.00065 U	<0.17 U	<0.00067 U	<0.00054 U	<0.00065 U	<0.00056 U	<0.00062 U	<0.00076 U	<0.00053 U
Chloroethane	75-00-3	NS	NS	NS	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	<0.0021 U
Chloroform	67-66-3	0.37	0.37	49	mg/kg	<1 U	<0.099 U	<0.1 U	<0.0019 U	<0.51 U	<0.002 U	<0.0016 U	<0.0019 U	<0.0017 U	<0.0019 U	<0.0023 U	<0.0016 U
Chloromethane	74-87-3	NS	NS	NS	mg/kg	<2.8 U	<0.26 U	<0.27 U	<0.0052 U	<1.4 U	<0.0054 U	<0.0043 U	<0.0052 U	<0.0045 U	<0.005 U	<0.006 U	<0.0042 U
Cis-1,2-Dichloroethene	156-59-2	0.25	0.25	100	mg/kg	<0.7 U	<0.066 U	<0.069 U	<0.0013 U	<0.34 U	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	mg/kg	<0.35 U	<0.033 U	<0.034 U	<0.00065 U	<0.17 U	<0.00067 U	<0.00054 U	<0.00065 U	<0.00056 U	<0.00062 U	<0.00076 U	<0.00053 U
Cymene	99-87-6	NS	NS	NS	mg/kg	4.7	0.04 J	0.14	<0.0013 U	2.7	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	0.18 J
Dibromochloromethane	124-48-1	NS	NS	NS	mg/kg	<0.7 U	<0.066 U	<0.069 U	<0.0013 U	<0.34 U	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U
Dibromomethane	74-95-3	NS	NS	NS	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	<0.0021 U
Dichlorodifluoromethane	75-71-8	NS	NS	NS	mg/kg	<7 U	<0.66 U	<0.69 U	<0.013 U	<3.4 U	<0.013 U	<0.011 U	<0.013 U	<0.011 U	<0.012 U	<0.015 U	<0.01 U
Diethyl Ether (Ethyl Ether)	60-29-7	NS	NS	NS	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	<0.0021 U
Ethylbenzene	100-41-4	**1**	1	41	mg/kg	**6.3**	0.32	0.2	<0.0013 U	**8.2**	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	0.18 J
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<2.8 U	<0.26 U	<0.27 U	<0.0052 U	<1.4 U	<0.0054 U	<0.0043 U	<0.0052 U	<0.0045 U	<0.005 U	<0.006 U	<0.0042 U
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	mg/kg	6	0.081	0.057 J	<0.0013 U	4.6	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	0.034 J
M,P-Xylene	179601-23-1	NS	NS	NS	mg/kg	63	2.4	0.82	<0.0026 U	50	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	0.074 J
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	0.12	100	mg/kg	<7 U	<0.66 U	<0.69 U	<0.013 U	<3.4 U	<0.013 U	<0.011 U	<0.013 U	<0.011 U	<0.012 U	<0.015 U	<0.01 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	NS	NS	mg/kg	<7 U	<0.66 U	<0.69 U	<0.013 U	<3.4 U	<0.013 U	<0.011 U	<0.013 U	<0.011 U	<0.012 U	<0.015 U	<0.01 U
Methylene Chloride	75-09-2	0.05	0.05	100	mg/kg	<3.5 U	<0.33 U	<0.34 U	<0.0065 U	<1.7 U	<0.0067 U	<0.0054 U	<0.0065 U	<0.0056 U	<0.0062 U	<0.0076 U	<0.0053 U
Naphthalene	91-20-3	**12**	12	100	mg/kg	**68**	0.44	0.56 J	<0.0052 UJ	**34**	<0.0054 U	<0.0043 U	<0.0052 U	<0.0045 U	<0.005 UJ	<0.006 U	0.64
n-Butylbenzene	104-51-8	**12**	12	100	mg/kg	**17**	0.18	1.3	<0.0013 U	**14**	0.00023 J	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	0.38 J
n-Propylbenzene	103-65-1	**3.9**	3.9	100	mg/kg	**25**	0.31	0.41	<0.0013 U	**21**	0.00034 J	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	0.2 J
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	NS	NS	mg/kg	29	1	0.2	<0.0013 U	20	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	0.25 J
Sec-Butylbenzene	135-98-8	**11**	11	100	mg/kg	6.2	0.062 J	0.28	<0.0013 U	4.2	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	0.28 J
Styrene	100-42-5	NS	NS	NS	mg/kg	<0.7 U	0.021 J	<0.069 U	<0.0013 U	<0.34 U	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	0.00039 J
T-Butylbenzene	98-06-6	5.9	5.9	100	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	0.02 J
Tert-Butyl Methyl Ether	1634-04-4	0.93	0.93	100	mg/kg	<1.4 U	<0.13 U	<0.14 U	<0.0026 U	<0.68 U	<0.0027 U	<0.0022 U	<0.0026 U	<0.0022 U	<0.0025 U	<0.003 U	<0.0021 U
Tetrachloroethene (PCE)	127-18-4	1.3	1.3	19	mg/kg	<0.35 U	<0.033 U	<0.034 U	<0.00065 U	<0.17 U	<0.00067 U	<0.00054 U	<0.00065 U	<0.00056 U	<0.00062 U	<0.00076 U	<0.00053 U
Toluene	108-88-3	**0.7**	0.7	100	mg/kg	<0.7 U	0.15	0.17	<0.0013 U	<0.34 U	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	0.001 J
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	NS	NS	mg/kg	<0.7 U	<0.066 U	<0.069 U	<0.0013 U	<0.34 U	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U
Total Xylenes	1330-20-7	**0.26**	1.6	100	mg/kg	**92**	**3.4**	**1**	<0.0013 U	**70**	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	**0.32 J**
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	NS	NS	NS	mg/kg	<0.35 U	<0.033 U	<0.034 U	<0.00065 U	<0.17 U	<0.00067 U	<0.00054 U	<0.00065 U	<0.00056 U	<0.00062 U	<0.00076 U	<0.00053 U
Trans-1,2-Dichloroethene	156-60-5	0.19	0.19	100	mg/kg	<1 U	<0.099 U	<0.1 U	<0.0019 U	<0.51 U	<0.002 U	<0.0016 U	<0.0019 U	<0.0017 U	<0.0019 U	<0.0023 U	<0.0016 U
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	mg/kg	<0.7 U	<0.066 U	<0.069 U	<0.0013 U	<0.34 U	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	NS	NS	mg/kg	<3.5 U	<0.33 U	<0.34 U	<0.0065 U	<1.7 U	<0.0067 U	<0.0054 U	<0.0065 U	<0.0056 U	<0.0062 U	<0.0076 U	<0.0053 U
Trichloroethene (TCE)	79-01-6	0.47	0.47	21	mg/kg	<0.35 U	<0.033 U	<0.034 U	<0.00065 U	<0.17 U	<0.00067 U	<0.00054 U	<0.00065 U	<0.00056 U	<0.00062 U	<0.00076 U	<0.00053 U
Trichlorofluoromethane	75-69-4	NS	NS	NS	mg/kg	<2.8 U	<0.26 U	<0.27 U	<0.0052 U	<1.4 U	<0.0054 U	<0.0043 U	<0.0052 U	<0.0045 U	<0.005 U	<0.006 U	<0.0042 U
Vinyl Acetate	108-05-4	NS	NS	NS	mg/kg	<7 U	<0.66 U	<0.69 U	<0.013 U	<3.4 U	<0.013 U	<0.011 U	<0.013 U	<0.011 U	<0.012 U	<0.015 U	<0.01 U
Vinyl Chloride	75-01-4	0.02	0.02	0.9	mg/kg	<0.7 U	<0.066 U	<0.069 U	<0.0013 U	<0.34 U	<0.0013 U	<0.0011 U	<0.0013 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U
Total VOCs	TOTAL VOCS	NS	NS	NS	mg/kg	1520.2	15.054	18.215	ND	770.7	0.01716	0.0056	0.019	0.00757	ND	ND	9.05939

Table 1B
Remedial Investigation Soil Sample Analytical Results - Petroleum Impacts Delineation
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB35_E2	SB35_E3	SB35_E5	SB35_E6	SB35_N1	SB35_N2	SB35_N2	SB35_N3	SB35_SW1	SB35_SW1	SB35_SW1	SB35_SW2
					Sample Name	SB35_E2_8-10	SB35_E3_12-14	SB35_E5_8-10	SB35_E6_14-16	SB35_N1_8-10	SB35_N2_8-10	SB35_N2_14-16	SB35_N3_8-10	SB35_SW1_8-10	SBDUP02_052423	SB35_SW1_10-12	SB35_SW2_7-9
					Sample Date	05/23/2023	05/23/2023	05/24/2023	05/24/2023	05/23/2023	05/23/2023	05/23/2023	05/30/2023	05/24/2023	05/24/2023	05/24/2023	05/30/2023
					Sample Depth	8-10	12-14	8-10	14-16	8-10	8-10	14-16	8-10	8-10	8-10	10-12	7-9
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																	
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	NA	NA	<0.028 UJ	<0.027 UJ	NA	NA	<0.029 UJ	<0.03 UJ	NA	<0.03 U	NA	NA
2,4,5-Trichlorophenol	95-95-4	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	mg/kg	NA	NA	<0.11 U	<0.11 U	NA	NA	<0.12 U	<0.12 U	NA	<0.12 U	NA	NA
2,4-Dichlorophenol	120-83-2	NS	NS	NS	mg/kg	NA	NA	<0.17 U	<0.16 U	NA	NA	<0.17 U	<0.18 U	NA	<0.18 U	NA	NA
2,4-Dimethylphenol	105-67-9	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
2,4-Dinitrophenol	51-28-5	NS	NS	NS	mg/kg	NA	NA	<0.9 UJ	<0.88 UJ	NA	NA	<0.92 UJ	<0.96 UJ	NA	<0.95 U	NA	NA
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
2,6-Dinitrotoluene	606-20-2	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
2-Chloronaphthalene	91-58-7	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
2-Chlorophenol	95-57-8	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
2-Methylnaphthalene	91-57-6	NS	NS	NS	mg/kg	NA	NA	3.5	<0.22 U	NA	NA	<0.23 U	<0.24 U	NA	0.024 J	NA	NA
2-Methylphenol (o-Cresol)	95-48-7	0.33	0.33	100	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
2-Nitroaniline	88-74-4	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
2-Nitrophenol	88-75-5	NS	NS	NS	mg/kg	NA	NA	<0.4 U	<0.39 U	NA	NA	<0.42 U	<0.43 U	NA	<0.43 U	NA	NA
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	0.33	100	mg/kg	NA	NA	0.04 J	<0.26 U	NA	NA	<0.28 U	<0.29 U	NA	<0.28 U	NA	NA
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
3-Nitroaniline	99-09-2	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
4,6-Dinitro-2-Methylphenol	534-52-1	NS	NS	NS	mg/kg	NA	NA	<0.49 U	<0.47 U	NA	NA	<0.5 U	<0.52 U	NA	<0.51 U	NA	NA
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
4-Chloro-3-Methylphenol	59-50-7	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
4-Chloroaniline	106-47-8	NS	NS	NS	mg/kg	NA	NA	<0.19 UJ	<0.18 UJ	NA	NA	<0.19 UJ	<0.2 UJ	NA	<0.2 U	NA	NA
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
4-Nitroaniline	100-01-6	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
4-Nitrophenol	100-02-7	NS	NS	NS	mg/kg	NA	NA	<0.26 U	<0.26 U	NA	NA	<0.27 U	<0.28 U	NA	<0.28 U	NA	NA
Acenaphthene	83-32-9	20	98	100	mg/kg	NA	NA	0.09 J	<0.14 U	NA	NA	<0.15 U	<0.16 U	NA	<0.16 U	NA	NA
Acenaphthylene	208-96-8	100	107	100	mg/kg	NA	NA	0.09 J	<0.14 U	NA	NA	<0.15 U	<0.16 U	NA	<0.16 U	NA	NA
Acetophenone	98-86-2	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
Anthracene	120-12-7	100	1000	100	mg/kg	NA	NA	0.22	<0.11 U	NA	NA	<0.12 U	<0.12 U	NA	0.062 J	NA	NA
Benzo(a)anthracene	56-55-3	1	1	1	mg/kg	NA	NA	0.82	<0.11 U	NA	NA	<0.12 U	<0.12 U	NA	0.037 J	NA	NA
Benzo(a)pyrene	50-32-8	**1**	22	1	mg/kg	NA	NA	**1.1**	<0.14 U	NA	NA	<0.15 U	<0.16 U	NA	<0.16 U	NA	NA
Benzo(b)fluoranthene	205-99-2	**1**	1.7	1	mg/kg	NA	NA	**1.4**	<0.11 U	NA	NA	<0.12 U	<0.12 U	NA	<0.12 U	NA	NA
Benzo(g,h,i)Perylene	191-24-2	100	1000	100	mg/kg	NA	NA	0.62	<0.14 U	NA	NA	<0.15 U	<0.16 U	NA	<0.16 U	NA	NA
Benzo(k)fluoranthene	207-08-9	0.8	1.7	3.9	mg/kg	NA	NA	0.38	<0.11 U	NA	NA	<0.12 U	<0.12 U	NA	<0.12 U	NA	NA
Benzoic Acid	65-85-0	NS	NS	NS	mg/kg	NA	NA	<0.61 U	<0.59 U	NA	NA	<0.62 U	<0.65 U	NA	<0.64 U	NA	NA
Benzyl Alcohol	100-51-6	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
Benzyl Butyl Phthalate	85-68-7	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
Biphenyl (Diphenyl)	92-52-4	NS	NS	NS	mg/kg	NA	NA	0.084 J	<0.42 U	NA	NA	<0.44 U	<0.46 U	NA	<0.45 U	NA	NA
Bis(2-chloroethoxy) methane	111-91-1	NS	NS	NS	mg/kg	NA	NA	<0.2 U	<0.2 U	NA	NA	<0.21 U	<0.22 U	NA	<0.21 U	NA	NA
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	NS	NS	mg/kg	NA	NA	<0.17 U	<0.16 U	NA	NA	<0.17 U	<0.18 U	NA	<0.18 U	NA	NA
Bis(2-chloroisopropyl) ether	108-60-1	NS	NS	NS	mg/kg	NA	NA	<0.22 U	<0.22 U	NA	NA	<0.23 U	<0.24 U	NA	<0.24 U	NA	NA
Bis(2-ethylhexyl) phthalate	117-81-7	NS	NS	NS	mg/kg	NA	NA	0.1 J	<0.18 U	NA	NA	<0.19 U	0.2	NA	<0.2 U	NA	NA
Carbazole	86-74-8	NS	NS	NS	mg/kg	NA	NA	0.089 J	<0.18 UJ	NA	NA	<0.19 UJ	<0.2 UJ	NA	<0.2 U	NA	NA
Chrysene	218-01-9	1	1	3.9	mg/kg	NA	NA	0.84	<0.11 U	NA	NA	<0.12 U	<0.12 U	NA	0.039 J	NA	NA
Dibenz(a,h)anthracene	53-70-3	0.33	1000	0.33	mg/kg	NA	NA	0.16	<0.11 U	NA	NA	<0.12 U	<0.12 U	NA	<0.12 U	NA	NA
Dibenzofuran	132-64-9	7	210	59	mg/kg	NA	NA	0.07 J	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	0.054 J	NA	NA
Dibutyl phthalate	84-74-2	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
Diethyl phthalate	84-66-2	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
Dimethyl phthalate	131-11-3	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
Dioctyl phthalate	117-84-0	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
Fluoranthene	206-44-0	100	1000	100	mg/kg	NA	NA	1.3	<0.11 U	NA	NA	<0.12 U	0.031 J	NA	0.34	NA	NA
Fluorene	86-73-7	30	386	100	mg/kg	NA	NA	0.13 J	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	0.034 J	NA	NA
Hexachlorobenzene	118-74-1	0.33	3.2	1.2	mg/kg	NA	NA	<0.11 U	<0.11 U	NA	NA	<0.12 U	<0.12 U	NA	<0.12 U	NA	NA
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	mg/kg	NA	NA	<0.54 UJ	<0.52 UJ	NA	NA	<0.55 UJ	<0.57 UJ	NA	<0.56 U	NA	NA
Hexachloroethane	67-72-1	NS	NS	NS	mg/kg	NA	NA	<0.15 U	<0.14 U	NA	NA	<0.15 U	<0.16 U	NA	<0.16 U	NA	NA
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	8.2	0.5	mg/kg	NA	NA	**0.59**	<0.14 U	NA	NA	<0.15 U	<0.16 U	NA	<0.16 U	NA	NA
Isophorone	78-59-1	NS	NS	NS	mg/kg	NA	NA	<0.17 U	<0.16 U	NA	NA	<0.17 U	<0.18 U	NA	<0.18 U	NA	NA
Naphthalene	91-20-3	12	12	100	mg/kg	NA	NA	1.2	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	0.069 J	NA	NA
Nitrobenzene	98-95-3	NS	NS	NS	mg/kg	NA	NA	<0.17 U	<0.16 U	NA	NA	<0.17 U	<0.18 U	NA	<0.18 U	NA	NA
n-Nitrosodi-N-Propylamine	621-64-7	NS	NS	NS	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
n-Nitrosodiphenylamine	86-30-6	NS	NS	NS	mg/kg	NA	NA	<0.15 U	<0.14 U	NA	NA	<0.15 U	<0.16 U	NA	<0.16 U	NA	NA
Pentachlorophenol	87-86-5	0.8	0.8	6.7	mg/kg	NA	NA	<0.15 U	<0.14 U	NA	NA	<0.15 U	<0.16 U	NA	<0.16 U	NA	NA
Phenanthrene	85-01-8	100	1000	100	mg/kg	NA	NA	0.84	<0.11 U	NA	NA	<0.12 U	0.03 J	NA	0.41	NA	NA
Phenol	108-95-2	0.33	0.33	100	mg/kg	NA	NA	<0.19 U	<0.18 U	NA	NA	<0.19 U	<0.2 U	NA	<0.2 U	NA	NA
Pyrene	129-00-0	100	1000	100	mg/kg	NA	NA	1.1	<0.11 U	NA	NA	<0.12 U	0.031 J	NA	0.24	NA	NA
General Chemistry																	
Total Solids	TSOLID	NS	NS	NS	Percent	83.3	83.5	86.8	89.7	83.2	85	85.3	83	86.2	83.6	83.6	89.3

Table 1B
Remedial Investigation Soil Sample Analytical Results - Petroleum Impacts Delineation
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB35_SW3	SB35_SW3	SB35_SW3	SB35_W1	SB35_W2	SB35_W2	SB36_E1	SB36_NW1	SB36_S1	SB36_S2	SB36_S2	SB36_W1	SB36_W1
					Sample Name	SB35_SW3_7-9	SBDUP05_053023	SB35_SW3_14-16	SB35_W1_8-10	SB35_W2_8-10	SB35_W2_14-16	SB36_E1_8-10	SB36_NW1_8-10	SB36_S1_8-10	SB36_S2_8-10	SB36_S2_12-14	SB36_W1_8-10	SB36_W1_14-16
					Sample Date	05/30/2023	05/30/2023	05/30/2023	05/23/2023	05/23/2023	05/23/2023	05/24/2023	05/24/2023	05/24/2023	05/24/2023	05/24/2023	05/24/2023	05/24/2023
					Sample Depth	7-9	7-9	14-16	8-10	8-10	14-16	8-10	8-10	8-10	8-10	12-14	8-10	14-16
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																		
1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	NS	mg/kg	<0.00056 U	<0.00057 U	<0.00052 U	<0.66 U	<0.00074 U	<0.00054 U	<0.00062 U	<0.18 U	<0.00053 U	<0.00059 U	<0.00075 U	<0.0005 U	<0.00061 U
1,1,1-Trichloroethane	71-55-6	0.68	0.68	100	mg/kg	<0.00056 U	<0.00057 U	<0.00052 U	<0.66 U	<0.00074 U	<0.00054 U	<0.00062 U	<0.18 U	<0.00053 U	<0.00059 U	<0.00075 U	<0.0005 U	<0.00061 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	mg/kg	<0.00056 U	<0.00057 U	<0.00052 U	<0.66 U	<0.00074 U	<0.00054 U	<0.00062 U	<0.18 U	<0.00053 UJ	<0.00059 U	<0.00075 UJ	<0.0005 U	<0.00061 U
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	<1.3 U	<0.0015 U	<0.0011 U	<0.0012 U	<0.36 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U	<0.0012 U
1,1-Dichloroethane	75-34-3	0.27	0.27	26	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	<1.3 U	<0.0015 U	<0.0011 U	<0.0012 U	<0.36 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U	<0.0012 U
1,1-Dichloroethene	75-35-4	0.33	0.33	100	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	<1.3 U	<0.0015 U	<0.0011 U	<0.0012 U	<0.36 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U	<0.0012 U
1,1-Dichloropropene	563-58-6	NS	NS	NS	mg/kg	<0.00056 U	<0.00057 U	<0.00052 U	<0.66 U	<0.00074 U	<0.00054 U	<0.00062 U	<0.18 U	<0.00053 U	<0.00059 U	<0.00075 U	<0.0005 U	<0.00061 U
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	<0.0025 U	<0.72 U	<0.0021 UJ	<0.0024 U	<0.003 UJ	<0.002 U	<0.0024 U
1,2,3-Trichloropropane	96-18-4	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	<0.0025 U	<0.72 U	<0.0021 U	<0.0024 U	<0.003 U	<0.002 U	<0.0024 U
1,2,4,5-Tetramethylbenzene	95-93-2	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	120	0.0047	<0.0022 U	0.26	42	<0.0021 U	0.0017 J	<0.003 U	0.024	<0.0024 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	<0.0025 U	<0.72 U	<0.0021 U	<0.0024 U	<0.003 U	<0.002 U	<0.0024 U
1,2,4-Trimethylbenzene	95-63-6	**3.6**	3.6	52	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	**1,000**	0.027	<0.0022 U	0.46	**91**	<0.0021 U	<0.0024 U	<0.003 U	0.029	<0.0024 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	NS	NS	mg/kg	<0.0034 U	<0.0034 U	<0.0031 U	<4 U	<0.0044 U	<0.0033 U	<0.0037 U	<1.1 U	<0.0032 UJ	<0.0036 U	<0.0045 UJ	<0.003 U	<0.0037 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	NS	NS	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	<1.3 U	<0.0015 U	<0.0011 U	<0.0012 U	<0.36 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U	<0.0012 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	<0.0025 U	<0.72 U	<0.0021 U	<0.0024 U	<0.003 U	<0.002 U	<0.0024 U
1,2-Dichloroethane	107-06-2	0.02	0.02	3.1	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	<1.3 U	<0.0015 U	<0.0011 U	<0.0012 U	<0.36 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U	<0.0012 U
1,2-Dichloropropane	78-87-5	NS	NS	NS	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	<1.3 U	<0.0015 U	<0.0011 U	<0.0012 U	<0.36 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U	<0.0012 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	**8.4**	8.4	52	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	**270**	<0.003 U	<0.0022 U	0.17	**40**	<0.0021 U	<0.0024 U	<0.003 U	0.0075	<0.0024 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	<0.0025 U	<0.72 U	<0.0021 U	<0.0024 U	<0.003 U	<0.002 U	<0.0024 U
1,3-Dichloropropane	142-28-9	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	<0.0025 U	<0.72 U	<0.0021 U	<0.0024 U	<0.003 U	<0.002 U	<0.0024 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	<0.0025 U	<0.72 U	<0.0021 U	<0.0024 U	<0.003 U	<0.002 U	<0.0024 U
1,4-Diethyl Benzene	105-05-5	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	360	0.0008 J	<0.0022 U	0.42	140	<0.0021 U	0.0042	<0.003 U	0.0066	<0.0024 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<0.09 U	<0.092 U	<0.084 U	<110 U	<0.12 U	<0.087 U	<0.099 U	<29 U	<0.085 U	<0.095 U	<0.12 U	<0.08 U	<0.098 U
2,2-Dichloropropane	594-20-7	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	<0.0025 U	<0.72 U	<0.0021 U	<0.0024 U	<0.003 U	<0.002 U	<0.0024 U
2-Chlorotoluene	95-49-8	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	<0.0025 U	<0.72 U	<0.0021 U	<0.0024 U	<0.003 U	<0.002 U	<0.0024 U
2-Hexanone (MBK)	591-78-6	NS	NS	NS	mg/kg	<0.011 UJ	<0.011 UJ	<0.01 UJ	<13 U	<0.015 U	<0.011 U	<0.012 U	<3.6 U	<0.011 UJ	<0.012 U	<0.015 UJ	<0.01 U	<0.012 U
4-Chlorotoluene	106-43-4	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	<0.0025 U	<0.72 U	<0.0021 U	<0.0024 U	<0.003 U	<0.002 U	<0.0024 U
4-Ethyltoluene	622-96-8	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	780	<0.003 U	<0.0022 U	0.31	74	<0.0021 U	<0.0024 U	<0.003 U	0.018	<0.0024 U
Acetone	67-64-1	**0.05**	0.05	100	mg/kg	<0.011 U	<0.011 U	0.0096 J	<13 U	<0.015 U	0.0097 J	<0.012 U	<3.6 U	<0.011 U	<0.012 U	<0.015 U	<0.01 U	<0.012 U
Acrylonitrile	107-13-1	NS	NS	NS	mg/kg	<0.0045 U	<0.0046 U	<0.0042 U	<5.3 U	<0.0059 U	<0.0044 U	<0.005 U	<1.4 U	<0.0042 U	<0.0048 U	<0.006 U	<0.004 U	<0.0049 U
Benzene	71-43-2	**0.06**	0.06	4.8	mg/kg	<0.00056 U	<0.00057 U	<0.00052 U	<0.66 U	<0.00074 U	<0.00054 U	<0.00062 U	**0.24**	<0.00053 U	<0.00059 U	<0.00075 U	<0.0005 U	<0.00061 U
Bromobenzene	108-86-1	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	<0.0025 U	<0.72 U	<0.0021 U	<0.0024 U	<0.003 U	<0.002 U	<0.0024 U
Bromochloromethane	74-97-5	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	<0.0025 U	<0.72 U	<0.0021 U	<0.0024 U	<0.003 U	<0.002 U	<0.0024 U
Bromodichloromethane	75-27-4	NS	NS	NS	mg/kg	<0.00056 U	<0.00057 U	<0.00052 U	<0.66 U	<0.00074 U	<0.00054 U	<0.00062 U	<0.18 U	<0.00053 U	<0.00059 U	<0.00075 U	<0.0005 U	<0.00061 U
Bromoform	75-25-2	NS	NS	NS	mg/kg	<0.0045 U	<0.0046 U	<0.0042 U	<5.3 U	<0.0059 U	<0.0044 U	<0.005 U	<1.4 U	<0.0042 U	<0.0048 U	<0.006 U	<0.004 U	<0.0049 U
Bromomethane	74-83-9	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	<0.0025 U	<0.72 U	<0.0021 U	<0.0024 U	<0.003 U	<0.002 U	<0.0024 U
Carbon Disulfide	75-15-0	NS	NS	NS	mg/kg	<0.011 U	<0.011 U	<0.01 U	<13 U	<0.015 U	<0.011 U	<0.012 U	<3.6 U	<0.011 U	<0.012 U	<0.015 U	<0.01 U	<0.012 U
Carbon Tetrachloride	56-23-5	0.76	0.76	2.4	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	<1.3 U	<0.0015 U	<0.0011 U	<0.0012 U	<0.36 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U	<0.0012 U
Chlorobenzene	108-90-7	1.1	1.1	100	mg/kg	<0.00056 U	<0.00057 U	<0.00052 U	<0.66 U	<0.00074 U	<0.00054 U	<0.00062 U	<0.18 U	<0.00053 U	<0.00059 U	<0.00075 U	<0.0005 U	<0.00061 U
Chloroethane	75-00-3	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	<0.0025 U	<0.72 U	<0.0021 U	<0.0024 U	<0.003 U	<0.002 U	<0.0024 U
Chloroform	67-66-3	0.37	0.37	49	mg/kg	<0.0017 U	<0.0017 U	<0.0016 U	<2 U	<0.0022 U	<0.0016 U	<0.0018 U	<0.54 U	<0.0016 U	<0.0018 U	<0.0022 U	<0.0015 U	<0.0018 U
Chloromethane	74-87-3	NS	NS	NS	mg/kg	<0.0045 U	<0.0046 U	<0.0042 U	<5.3 U	<0.0059 U	<0.0044 U	<0.005 U	<1.4 U	<0.0042 U	<0.0048 U	<0.006 U	<0.004 U	<0.0049 U
Cis-1,2-Dichloroethene	156-59-2	0.25	0.25	100	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	<1.3 U	<0.0015 U	<0.0011 U	<0.0012 U	<0.36 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U	<0.0012 U
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	mg/kg	<0.00056 U	<0.00057 U	<0.00052 U	<0.66 U	<0.00074 U	<0.00054 U	<0.00062 U	<0.18 U	<0.00053 U	<0.00059 U	<0.00075 U	<0.0005 U	<0.00061 U
Cymene	99-87-6	NS	NS	NS	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	8.4	<0.0015 U	<0.0011 U	0.009	2.4	<0.0011 U	0.00014 J	<0.0015 U	0.00046 J	<0.0012 U
Dibromochloromethane	124-48-1	NS	NS	NS	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	<1.3 U	<0.0015 U	<0.0011 U	<0.0012 U	<0.36 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U	<0.0012 U
Dibromomethane	74-95-3	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	<0.0025 U	<0.72 U	<0.0021 U	<0.0024 U	<0.003 U	<0.002 U	<0.0024 U
Dichlorodifluoromethane	75-71-8	NS	NS	NS	mg/kg	<0.011 U	<0.011 U	<0.01 U	<13 U	<0.015 U	<0.011 U	<0.012 U	<3.6 U	<0.011 U	<0.012 U	<0.015 U	<0.01 U	<0.012 U
Diethyl Ether (Ethyl Ether)	60-29-7	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	<0.0025 U	<0.72 U	<0.0021 U	<0.0024 U	<0.003 U	<0.002 U	<0.0024 U
Ethylbenzene	100-41-4	**1**	1	41	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	**33**	0.0046	<0.0011 U	0.0071	0.7	<0.0011 U	<0.0012 U	<0.0015 U	0.0067	<0.0012 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.0045 U	<0.0046 U	<0.0042 U	<5.3 U	<0.0059 U	<0.0044 U	<0.005 U	<1.4 U	<0.0042 U	<0.0048 U	<0.006 U	<0.004 U	<0.0049 U
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	26	0.00074 J	<0.0011 U	0.0056	1.2	<0.0011 U	<0.0012 U	<0.0015 U	0.007	<0.0012 U
M,P-Xylene	179601-23-1	NS	NS	NS	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	240	<0.003 U	<0.0022 U	0.048	6.8	<0.0021 U	<0.0024 U	<0.003 U	0.017	<0.0024 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	0.12	100	mg/kg	<0.011 U	<0.011 U	<0.01 U	<13 U	<0.015 U	<0.011 U	<0.012 U	<3.6 U	<0.011 U	<0.012 U	<0.015 U	<0.01 U	<0.012 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	NS	NS	mg/kg	<0.011 U	<0.011 U	<0.01 U	<13 U	<0.015 U	<0.011 U	<0.012 U	<3.6 U	<0.011 U	<0.012 U	<0.015 U	<0.01 U	<0.012 U
Methylene Chloride	75-09-2	0.05	0.05	100	mg/kg	<0.0056 U	<0.0057 U	<0.0052 U	<6.6 U	<0.0074 U	<0.0054 U	<0.0062 U	<1.8 U	<0.0053 U	<0.0059 U	<0.0075 U	<0.005 U	<0.0061 U
Naphthalene	91-20-3	**12**	12	100	mg/kg	<0.0045 U	<0.0046 U	<0.0042 U	**130**	0.0036 J	<0.0044 U	0.25	5.5	<0.0042 UJ	0.0031 J	<0.006 UJ	0.0052	<0.0049 U
n-Butylbenzene	104-51-8	**12**	12	100	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	**53**	0.0006 J	<0.0011 U	0.046 J	11	<0.0011 U	<0.0012 U	<0.0015 U	0.0091	<0.0012 U
n-Propylbenzene	103-65-1	**3.9**	3.9	100	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	**110**	0.0023	<0.0011 U	0.026	**7.8**	<0.0011 U	<0.0012 U	<0.0015 U	0.018	<0.0012 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	NS	NS	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	78	0.00067 J	<0.0011 U	0.031	2	<0.0011 U	<0.0012 U	<0.0015 U	0.0095	<0.0012 U
Sec-Butylbenzene	135-98-8	**11**	11	100	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	**17**	<0.0015 U	<0.0011 U	0.01	4	<0.0011 U	0.0003 J	<0.0015 U	0.0041	<0.0012 U
Styrene	100-42-5	NS	NS	NS	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	<1.3 U	<0.0015 U	<0.0011 U	<0.0012 U	<0.36 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U	<0.0012 U
T-Butylbenzene	98-06-6	5.9	5.9	100	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	0.76 J	<0.003 U	<0.0022 U	0.00057 J	0.21 J	<0.0021 U	<0.0024 U	<0.003 U	0.00017 J	<0.0024 U
Tert-Butyl Methyl Ether	1634-04-4	0.93	0.93	100	mg/kg	<0.0022 U	<0.0023 U	<0.0021 U	<2.6 U	<0.003 U	<0.0022 U	0.00053 J	<0.72 U	<0.0021 U	<0.0024 U	<0.003 U	<0.002 U	<0.0024 U
Tetrachloroethene (PCE)	127-18-4	1.3	1.3	19	mg/kg	<0.00056 U	<0.00057 U	<0.00052 U	<0.66 U	<0.00074 U	<0.00054 U	<0.00062 U	<0.18 U	<0.00053 U	<0.00059 U	<0.00075 U	<0.0005 U	<0.00061 U
Toluene	108-88-3	**0.7**	0.7	100	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	<1.3 U	<0.0015 U	<0.0011 U	<0.0012 U	**0.9**	<0.0011 U	<0.0012 U	<0.0015 U	0.0009 J	<0.0012 U
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	NS	NS	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	<1.3 U	<0.0015 U	<0.0011 U	<0.0012 U	<0.36 U	<0.0011 U	<0.0012 U	<0.0015 U	0.00015 J	<0.0012 U
Total Xylenes	1330-20-7	**0.26**	1.6	100	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	**320**	0.00067 J	<0.0011 U	0.079	**8.8**	<0.0011 U	<0.0012 U	<0.0015 U	0.027	<0.0012 U
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	NS	NS	NS	mg/kg	<0.00056 U	<0.00057 U	<0.00052 U	<0.66 U	<0.00074 U	<0.00054 U	<0.00062 U	<0.18 U	<0.00053 U	<0.00059 U	<0.00075 U	<0.0005 U	<0.00061 U
Trans-1,2-Dichloroethene	156-60-5	0.19	0.19	100	mg/kg	<0.0017 U	<0.0017 U	<0.0016 U	<2 U	<0.0022 U	<0.0016 U	<0.0018 U	<0.54 U	<0.0016 U	<0.0018 U	<0.0022 U	0.00015 J	<0.0018 U
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	<1.3 U	<0.0015 U	<0.0011 U	<0.0012 U	<0.36 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U	<0.0012 U
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	NS	NS	mg/kg	<0.0056 U	<0.0057 U	<0.0052 U	<6.6 U	<0.0074 U	<0.0054 U	<0.0062 U	<1.8 U	<0.0053 U	<0.0059 U	<0.0075 U	<0.005 U	<0.0061 U
Trichloroethene (TCE)	79-01-6	0.47	0.47	21	mg/kg	<0.00056 U	<0.00057 U	<0.00052 U	<0.66 U	<0.00074 U	<0.00054 U	<0.00062 U	<0.18 U	<0.00053 U	<0.00059 U	<0.00075 U	<0.0005 U	<0.00061 U
Trichlorofluoromethane	75-69-4	NS	NS	NS	mg/kg	<0.0045 U	<0.0046 U	<0.0042 U	<5.3 U	<0.0059 U	<0.0044 U	<0.005 U	<1.4 U	<0.0042 U	<0.0048 U	<0.006 U	<0.004 U	<0.0049 U
Vinyl Acetate	108-05-4	NS	NS	NS	mg/kg	<0.011 U	<0.011 U	<0.01 U	<13 U	<0.015 U	<0.011 U	<0.012 U	<3.6 U	<0.011 U	<0.012 U	<0.015 U	<0.01 U	<0.012 U
Vinyl Chloride	75-01-4	0.02	0.02	0.9	mg/kg	<0.0011 U	<0.0011 U	<0.001 U	<1.3 U	<0.0015 U	<0.0011 U	<0.0012 U	<0.36 U	<0.0011 U	<0.0012 U	<0.0015 U	<0.001 U	<0.0012 U
Total VOCs	TOTAL VOCS	NS	NS	NS	mg/kg	ND	ND	0.0096	3226.16	0.04501	0.0097	2.0538	429.75	ND	0.00944	ND	0.16353	ND

Table 1B
Remedial Investigation Soil Sample Analytical Results - Petroleum Impacts Delineation
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	Location	SB35_SW3	SB35_SW3	SB35_SW3	SB35_W1	SB35_W2	SB35_W2	SB36_E1	SB36_NW1	SB36_S1	SB36_S2	SB36_S2	SB36_W1	SB36_W1
					Sample Name	SB35_SW3_7-9	SBDUP05_053023	SB35_SW3_14-16	SB35_W1_8-10	SB35_W2_8-10	SB35_W2_14-16	SB36_E1_8-10	SB36_NW1_8-10	SB36_S1_8-10	SB36_S2_8-10	SB36_S2_12-14	SB36_W1_8-10	SB36_W1_14-16
					Sample Date	05/30/2023	05/30/2023	05/30/2023	05/23/2023	05/23/2023	05/23/2023	05/24/2023	05/24/2023	05/24/2023	05/24/2023	05/24/2023	05/24/2023	05/24/2023
					Sample Depth	7-9	7-9	14-16	8-10	8-10	14-16	8-10	8-10	8-10	8-10	12-14	8-10	14-16
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																		
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<0.029 UJ	<0.027 U	<0.026 UJ	NA	NA	NA	NA	NA	NA	<0.028 UJ	<0.03 UJ	NA	NA
2,4,5-Trichlorophenol	95-95-4	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	mg/kg	<0.12 U	<0.11 U	<0.1 U	NA	NA	NA	NA	NA	NA	<0.11 U	<0.12 U	NA	NA
2,4-Dichlorophenol	120-83-2	NS	NS	NS	mg/kg	<0.17 U	<0.16 U	<0.16 U	NA	NA	NA	NA	NA	NA	<0.17 U	<0.18 U	NA	NA
2,4-Dimethylphenol	105-67-9	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
2,4-Dinitrophenol	51-28-5	NS	NS	NS	mg/kg	<0.92 UJ	<0.86 U	<0.84 UJ	NA	NA	NA	NA	NA	NA	<0.89 UJ	<0.96 UJ	NA	NA
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
2,6-Dinitrotoluene	606-20-2	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
2-Chloronaphthalene	91-58-7	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
2-Chlorophenol	95-57-8	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
2-Methylnaphthalene	91-57-6	NS	NS	NS	mg/kg	<0.23 U	<0.22 U	<0.21 U	NA	NA	NA	NA	NA	NA	<0.22 U	<0.24 U	NA	NA
2-Methylphenol (o-Cresol)	95-48-7	0.33	0.33	100	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
2-Nitroaniline	88-74-4	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
2-Nitrophenol	88-75-5	NS	NS	NS	mg/kg	<0.42 U	<0.39 U	<0.38 U	NA	NA	NA	NA	NA	NA	<0.4 U	<0.43 U	NA	NA
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	0.33	100	mg/kg	<0.28 U	<0.26 U	<0.25 U	NA	NA	NA	NA	NA	NA	<0.27 U	<0.29 U	NA	NA
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
3-Nitroaniline	99-09-2	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
4,6-Dinitro-2-Methylphenol	534-52-1	NS	NS	NS	mg/kg	<0.5 U	<0.47 U	<0.46 U	NA	NA	NA	NA	NA	NA	<0.48 U	<0.52 U	NA	NA
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
4-Chloro-3-Methylphenol	59-50-7	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
4-Chloroaniline	106-47-8	NS	NS	NS	mg/kg	<0.19 UJ	<0.18 UJ	<0.18 UJ	NA	NA	NA	NA	NA	NA	<0.18 UJ	<0.2 UJ	NA	NA
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
4-Nitroaniline	100-01-6	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
4-Nitrophenol	100-02-7	NS	NS	NS	mg/kg	<0.27 U	<0.25 U	<0.24 U	NA	NA	NA	NA	NA	NA	<0.26 U	<0.28 U	NA	NA
Acenaphthene	83-32-9	20	98	100	mg/kg	<0.15 U	<0.14 U	<0.14 U	NA	NA	NA	NA	NA	NA	<0.15 U	<0.16 U	NA	NA
Acenaphthylene	208-96-8	100	107	100	mg/kg	<0.15 U	<0.14 U	<0.14 U	NA	NA	NA	NA	NA	NA	<0.15 U	<0.16 U	NA	NA
Acetophenone	98-86-2	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
Anthracene	120-12-7	100	1000	100	mg/kg	<0.12 U	<0.11 U	<0.1 U	NA	NA	NA	NA	NA	NA	<0.11 U	<0.12 U	NA	NA
Benzo(a)anthracene	56-55-3	1	1	1	mg/kg	<0.12 U	<0.11 U	<0.1 U	NA	NA	NA	NA	NA	NA	0.028 J	<0.12 U	NA	NA
Benzo(a)pyrene	50-32-8	**1**	22	1	mg/kg	<0.15 U	<0.14 U	<0.14 U	NA	NA	NA	NA	NA	NA	<0.15 U	<0.16 U	NA	NA
Benzo(b)fluoranthene	205-99-2	**1**	1.7	1	mg/kg	<0.12 U	<0.11 U	<0.1 U	NA	NA	NA	NA	NA	NA	<0.11 U	<0.12 U	NA	NA
Benzo(g,h,i)Perylene	191-24-2	100	1000	100	mg/kg	<0.15 U	<0.14 U	<0.14 U	NA	NA	NA	NA	NA	NA	<0.15 U	<0.16 U	NA	NA
Benzo(k)fluoranthene	207-08-9	0.8	1.7	3.9	mg/kg	<0.12 U	<0.11 U	<0.1 U	NA	NA	NA	NA	NA	NA	<0.11 U	<0.12 U	NA	NA
Benzoic Acid	65-85-0	NS	NS	NS	mg/kg	<0.62 U	<0.58 UJ	<0.57 U	NA	NA	NA	NA	NA	NA	<0.6 U	<0.65 U	NA	NA
Benzyl Alcohol	100-51-6	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
Benzyl Butyl Phthalate	85-68-7	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
Biphenyl (Diphenyl)	92-52-4	NS	NS	NS	mg/kg	<0.44 U	<0.41 U	<0.4 U	NA	NA	NA	NA	NA	NA	<0.42 U	<0.46 U	NA	NA
Bis(2-chloroethoxy) methane	111-91-1	NS	NS	NS	mg/kg	<0.21 U	<0.19 U	<0.19 U	NA	NA	NA	NA	NA	NA	<0.2 U	<0.22 U	NA	NA
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	NS	NS	mg/kg	<0.17 U	<0.16 U	<0.16 U	NA	NA	NA	NA	NA	NA	<0.17 U	<0.18 U	NA	NA
Bis(2-chloroisopropyl) ether	108-60-1	NS	NS	NS	mg/kg	<0.23 U	<0.22 U	<0.21 U	NA	NA	NA	NA	NA	NA	<0.22 U	<0.24 U	NA	NA
Bis(2-ethylhexyl) phthalate	117-81-7	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
Carbazole	86-74-8	NS	NS	NS	mg/kg	<0.19 UJ	<0.18 U	<0.18 UJ	NA	NA	NA	NA	NA	NA	<0.18 UJ	<0.2 UJ	NA	NA
Chrysene	218-01-9	1	1	3.9	mg/kg	<0.12 U	<0.11 U	<0.1 U	NA	NA	NA	NA	NA	NA	0.022 J	<0.12 U	NA	NA
Dibenz(a,h)anthracene	53-70-3	0.33	1000	0.33	mg/kg	<0.12 U	<0.11 U	<0.1 U	NA	NA	NA	NA	NA	NA	<0.11 U	<0.12 U	NA	NA
Dibenzofuran	132-64-9	7	210	59	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
Dibutyl phthalate	84-74-2	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
Diethyl phthalate	84-66-2	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
Dimethyl phthalate	131-11-3	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
Dioctyl phthalate	117-84-0	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
Fluoranthene	206-44-0	100	1000	100	mg/kg	<0.12 U	<0.11 U	<0.1 U	NA	NA	NA	NA	NA	NA	0.063 J	<0.12 U	NA	NA
Fluorene	86-73-7	30	386	100	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	0.029 J	<0.2 U	NA	NA
Hexachlorobenzene	118-74-1	0.33	3.2	1.2	mg/kg	<0.12 U	<0.11 U	<0.1 U	NA	NA	NA	NA	NA	NA	<0.11 U	<0.12 U	NA	NA
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	mg/kg	<0.55 UJ	<0.51 UJ	<0.5 UJ	NA	NA	NA	NA	NA	NA	<0.53 UJ	<0.57 UJ	NA	NA
Hexachloroethane	67-72-1	NS	NS	NS	mg/kg	<0.15 U	<0.14 U	<0.14 U	NA	NA	NA	NA	NA	NA	<0.15 U	<0.16 U	NA	NA
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	8.2	0.5	mg/kg	<0.15 U	<0.14 U	<0.14 U	NA	NA	NA	NA	NA	NA	<0.15 U	<0.16 U	NA	NA
Isophorone	78-59-1	NS	NS	NS	mg/kg	<0.17 U	<0.16 U	<0.16 U	NA	NA	NA	NA	NA	NA	<0.17 U	<0.18 U	NA	NA
Naphthalene	91-20-3	12	12	100	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	0.2	0.038 J	NA	NA
Nitrobenzene	98-95-3	NS	NS	NS	mg/kg	<0.17 U	<0.16 U	<0.16 U	NA	NA	NA	NA	NA	NA	<0.17 U	<0.18 U	NA	NA
n-Nitrosodi-N-Propylamine	621-64-7	NS	NS	NS	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
n-Nitrosodiphenylamine	86-30-6	NS	NS	NS	mg/kg	<0.15 U	<0.14 U	<0.14 U	NA	NA	NA	NA	NA	NA	<0.15 U	<0.16 U	NA	NA
Pentachlorophenol	87-86-5	0.8	0.8	6.7	mg/kg	<0.15 U	<0.14 U	<0.14 U	NA	NA	NA	NA	NA	NA	<0.15 U	<0.16 U	NA	NA
Phenanthrene	85-01-8	100	1000	100	mg/kg	<0.12 U	<0.11 U	<0.1 U	NA	NA	NA	NA	NA	NA	0.11	<0.12 U	NA	NA
Phenol	108-95-2	0.33	0.33	100	mg/kg	<0.19 U	<0.18 U	<0.18 U	NA	NA	NA	NA	NA	NA	<0.18 U	<0.2 U	NA	NA
Pyrene	129-00-0	100	1000	100	mg/kg	<0.12 U	<0.11 U	<0.1 U	NA	NA	NA	NA	NA	NA	0.074 J	<0.12 U	NA	NA
General Chemistry																		
Total Solids	TSOLID	NS	NS	NS	Percent	86	91	93.6	82.6	83.7	87.4	87	81.1	88.8	87.1	82.7	84.6	90.8

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Notes:

CAS - Chemical Abstract Service
NS - No standard
mg/kg - milligram per kilogram
NA - Not analyzed
RL - Reporting limit
<RL - Not detected

Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 of the Official Compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use, Protection of Groundwater, and Restricted Use Restricted-Residential Soil Cleanup Objectives (SCO).

Criterion comparisons for 3- & 4-methylphenol (m&p cresol) are provided for reference. Promulgated SCOs are for 3-methylphenol (m-cresol) and 4-methylphenol (p-cresol).

Qualifiers:

J - The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
UJ - The analyte was not detected at a level greater than or equal to the RL; however, the reported RL is approximate and may be inaccurate or imprecise.
U - The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the RL or the sample concentration for results impacted by blank contamination.

Exceedance Summary:

10 - Result exceeds Unrestricted Use SCOs
10 - Result exceeds Protection of Groundwater SCOs
10 - Result exceeds Restricted Use Restricted-Residential SCOs

Table 1C
Remedial Investigation Groundwater Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
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Analyte	CAS Number	NYSDEC SGVs	Location	MW19	MW21	MW26	MW27	MW28	MW29	MW30	MW31	MW32
			Sample Name	MW19_060923	MW21_060923	MW26_060923	MW27_060723	MW28_060923	MW29_060723	MW30_060723	MW31_060723	MW32_060723
			Sample Date	06/09/2023	06/09/2023	06/09/2023	06/07/2023	06/09/2023	06/07/2023	06/07/2023	06/07/2023	06/07/2023
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds												
1,1,1,2-Tetrachloroethane	630-20-6	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
1,1,1-Trichloroethane	71-55-6	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
1,1,2,2-Tetrachloroethane	79-34-5	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1.2 U	<0.5 U	<0.5 U	<0.5 U
1,1,2-Trichloroethane	79-00-5	1	ug/l	<1.5 U	<1.5 U	<1.5 U	<1.5 U	<1.5 U	<3.8 U	<1.5 U	<1.5 U	<1.5 U
1,1-Dichloroethane	75-34-3	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
1,1-Dichloroethene	75-35-4	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1.2 U	<0.5 U	<0.5 U	<0.5 U
1,1-Dichloropropene	563-58-6	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
1,2,3-Trichlorobenzene	87-61-6	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
1,2,3-Trichloropropane	96-18-4	0.04	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
1,2,4,5-Tetramethylbenzene	95-93-2	**5**	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<5 U	<2 U	<2 U	<2 U
1,2,4-Trichlorobenzene	120-82-1	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
1,2,4-Trimethylbenzene	95-63-6	**5**	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
1,2-Dibromo-3-Chloropropane	96-12-8	0.04	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.0006	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<5 U	<2 U	<2 U	<2 U
1,2-Dichlorobenzene	95-50-1	3	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
1,2-Dichloroethane	107-06-2	0.6	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1.2 U	<0.5 U	<0.5 U	<0.5 U
1,2-Dichloropropane	78-87-5	1	ug/l	<1 U	<1 U	<1 U	<1 U	<1 U	<2.5 U	<1 U	<1 U	<1 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	**5**	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
1,3-Dichlorobenzene	541-73-1	3	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
1,3-Dichloropropane	142-28-9	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
1,4-Dichlorobenzene	106-46-7	3	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
1,4-Diethyl Benzene	105-05-5	NS	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<5 U	<2 U	<2 U	<2 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.35	ug/l	<250 U	<250 U	<250 U	<250 UJ	<250 U	<620 UJ	<250 UJ	<250 UJ	<250 UJ
2,2-Dichloropropane	594-20-7	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
2-Chlorotoluene	95-49-8	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
2-Hexanone (MBK)	591-78-6	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<12 U	<5 U	<5 U	<5 U
4-Chlorotoluene	106-43-4	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
4-Ethyltoluene	622-96-8	NS	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<5 U	<2 U	<2 U	<2 U
Acetone	67-64-1	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<12 U	<5 U	<5 U	<5 U
Acrylonitrile	107-13-1	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<12 U	<5 U	<5 U	<5 U
Benzene	71-43-2	**1**	ug/l	<0.5 U	0.17 J	<0.5 U	<0.5 U	<0.5 U	<1.2 U	<0.5 U	<0.5 U	<0.5 U
Bromobenzene	108-86-1	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Bromochloromethane	74-97-5	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Bromodichloromethane	75-27-4	50	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1.2 U	<0.5 U	<0.5 U	<0.5 U
Bromoform	75-25-2	50	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<5 U	<2 U	<2 U	<2 U
Bromomethane	74-83-9	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 UJ	<2.5 U	<6.2 UJ	<2.5 UJ	<2.5 UJ	<2.5 UJ
Carbon Disulfide	75-15-0	60	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<12 U	<5 U	<5 U	<5 U
Carbon Tetrachloride	56-23-5	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1.2 U	<0.5 U	<0.5 U	<0.5 U
Chlorobenzene	108-90-7	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Chloroethane	75-00-3	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Chloroform	67-66-3	7	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Chloromethane	74-87-3	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Cis-1,2-Dichloroethene	156-59-2	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	2.4 J	<2.5 U
Cis-1,3-Dichloropropene	10061-01-5	0.4	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1.2 U	<0.5 U	<0.5 U	<0.5 U
Cymene	99-87-6	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Dibromochloromethane	124-48-1	50	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1.2 U	<0.5 U	<0.5 U	<0.5 U
Dibromomethane	74-95-3	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<12 U	<5 U	<5 U	<5 U
Dichlorodifluoromethane	75-71-8	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<12 U	<5 U	<5 U	<5 U
Diethyl Ether (Ethyl Ether)	60-29-7	NS	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Ethylbenzene	100-41-4	**5**	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Hexachlorobutadiene	87-68-3	0.5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Isopropylbenzene (Cumene)	98-82-8	**5**	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
M,P-Xylene	179601-23-1	**5**	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<12 U	<5 U	<5 U	<5 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<12 U	<5 U	<5 U	<5 U
Methylene Chloride	75-09-2	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Naphthalene	91-20-3	**10**	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 UJ	<2.5 U	<6.2 UJ	<2.5 UJ	<2.5 UJ	<2.5 UJ
n-Butylbenzene	104-51-8	**5**	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
n-Propylbenzene	103-65-1	**5**	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	**5**	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Sec-Butylbenzene	135-98-8	**5**	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Styrene	100-42-5	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
T-Butylbenzene	98-06-6	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Tert-Butyl Methyl Ether	1634-04-4	10	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Tetrachloroethene (PCE)	127-18-4	5	ug/l	<0.5 U	<0.5 U	<0.5 U	0.49 J	0.34 J	<1.2 U	<0.5 U	<0.5 U	<0.5 U
Toluene	108-88-3	**5**	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	2.4 J	<2.5 U
Total Xylenes	1330-20-7	**5**	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	0.4	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1.2 U	<0.5 U	<0.5 U	<0.5 U
Trans-1,2-Dichloroethene	156-60-5	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Trans-1,3-Dichloropropene	10061-02-6	0.4	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1.2 U	<0.5 U	<0.5 U	<0.5 U
Trans-1,4-Dichloro-2-Butene	110-57-6	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Trichloroethene (TCE)	79-01-6	5	ug/l	<0.5 U	<0.5 U	<0.5 U	0.24 J	<0.5 U	<1.2 U	0.18 J	0.3 J	<0.5 U
Trichlorofluoromethane	75-69-4	5	ug/l	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U	<2.5 U	<2.5 U	<2.5 U
Vinyl Acetate	108-05-4	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<12 U	<5 U	<5 U	<5 U
Vinyl Chloride	75-01-4	2	ug/l	<1 U	<1 U	<1 U	0.08 J	<1 U	<2.5 U	<1 U	<1 U	<1 U

Table 1C
Remedial Investigation Groundwater Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No. 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC SGVs	Location	MW19	MW21	MW26	MW27	MW28	MW29	MW30	MW31	MW32
			Sample Name	MW19_060923	MW21_060923	MW26_060923	MW27_060723	MW28_060923	MW29_060723	MW30_060723	MW31_060723	MW32_060723
			Sample Date	06/09/2023	06/09/2023	06/09/2023	06/07/2023	06/09/2023	06/07/2023	06/07/2023	06/07/2023	06/07/2023
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds												
1,2,4,5-Tetrachlorobenzene	95-94-3	5	ug/l	<10 U	<10 U	<10 U	<10 UJ	<10 U	<10 U	<10 U	<10 U	<10 U
1,2,4-Trichlorobenzene	120-82-1	5	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
1,2-Dichlorobenzene	95-50-1	3	ug/l	<2 U	<2 U	<2 U	<2 UJ	<2 U	<2 U	<2 U	<2 U	<2 U
1,3-Dichlorobenzene	541-73-1	3	ug/l	<2 U	<2 U	<2 U	<2 UJ	<2 U	<2 U	<2 U	<2 U	<2 U
1,4-Dichlorobenzene	106-46-7	3	ug/l	<2 U	<2 U	<2 U	<2 UJ	<2 U	<2 U	<2 U	<2 U	<2 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.35	ug/l	<0.144 U	<0.142 U	<0.142 U	0.0451 J	<0.144 U	<0.144 U	<0.144 U	<0.15 U	<0.147 U
2,4,5-Trichlorophenol	95-95-4	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
2,4,6-Trichlorophenol	88-06-2	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
2,4-Dichlorophenol	120-83-2	1	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
2,4-Dimethylphenol	105-67-9	**1**	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
2,4-Dinitrophenol	51-28-5	1	ug/l	<20 U	<20 U	<20 U	<20 U	<20 U	<20 U	<20 U	<20 U	<20 U
2,4-Dinitrotoluene	121-14-2	5	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
2,6-Dinitrotoluene	606-20-2	5	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
2-Chloronaphthalene	91-58-7	10	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
2-Chlorophenol	95-57-8	NS	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
2-Methylnaphthalene	91-57-6	NS	ug/l	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	0.16	0.04 J	0.12
2-Methylphenol (o-Cresol)	95-48-7	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
2-Nitroaniline	88-74-4	5	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
2-Nitrophenol	88-75-5	NS	ug/l	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
3,3'-Dichlorobenzidine	91-94-1	5	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
3-Nitroaniline	99-09-2	5	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	ug/l	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	ug/l	<2 U	<2 U	<2 U	<2 UJ	<2 U	<2 U	<2 U	<2 U	<2 U
4-Chloro-3-Methylphenol	59-50-7	NS	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
4-Chloroaniline	106-47-8	5	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	ug/l	<2 U	<2 U	<2 U	<2 UJ	<2 U	<2 U	<2 U	<2 U	<2 U
4-Nitroaniline	100-01-6	5	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
4-Nitrophenol	100-02-7	NS	ug/l	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
Acenaphthene	83-32-9	20	ug/l	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	0.15
Acenaphthylene	208-96-8	NS	ug/l	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	0.05 J	<0.1 U	<0.1 U
Acetophenone	98-86-2	NS	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
Anthracene	120-12-7	50	ug/l	<0.1 U	0.02 J	<0.1 U	<0.1 U	0.02 J	0.03 J	0.02 J	0.03 J	0.06 J
Benzo(a)anthracene	56-55-3	**0.002**	ug/l	<0.1 U	**0.03 J**	<0.1 U	**0.08 J**	<0.1 U	<0.1 U	<0.1 U	**0.07 J**	**0.03 J**
Benzo(a)pyrene	50-32-8	**0**	ug/l	<0.1 U	**0.04 J**	<0.1 U	**0.07 J**	<0.1 U	<0.1 U	<0.1 U	**0.06 J**	<0.1 U
Benzo(b)fluoranthene	205-99-2	**0.002**	ug/l	<0.1 U	**0.04 J**	<0.1 U	**0.23**	<0.1 U	<0.1 U	<0.1 U	**0.06 J**	<0.1 U
Benzo(g,h,i)Perylene	191-24-2	NS	ug/l	<0.1 U	0.04 J	<0.1 U	0.11	<0.1 U	<0.1 U	<0.1 U	0.03 J	<0.1 U
Benzo(k)fluoranthene	207-08-9	**0.002**	ug/l	<0.1 U	**0.04 J**	<0.1 U	**0.11**	<0.1 U	<0.1 U	<0.1 U	**0.03 J**	<0.1 U
Benzoic Acid	65-85-0	NS	ug/l	<50 U	<50 U	<50 U	<50 U	<50 U	<50 U	<50 U	<50 U	<50 U
Benzyl Alcohol	100-51-6	NS	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
Benzyl Butyl Phthalate	85-68-7	50	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
Biphenyl (Diphenyl)	92-52-4	5	ug/l	<2 U	<2 U	<2 U	<2 UJ	<2 U	<2 U	<2 U	<2 U	<2 U
Bis(2-chloroethoxy) methane	111-91-1	5	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	1	ug/l	<2 U	<2 U	<2 U	<2 UJ	<2 U	<2 U	<2 U	<2 U	<2 U
Bis(2-chloroisopropyl) ether	108-60-1	5	ug/l	<2 U	<2 U	<2 U	<2 UJ	<2 U	<2 U	<2 U	<2 U	<2 U
Bis(2-ethylhexyl) phthalate	117-81-7	5	ug/l	<3 U	<3 U	<3 U	<3 UJ	<3 U	<3 U	<3 U	<3 U	<3 U
Carbazole	86-74-8	NS	ug/l	<2 U	<2 U	<2 U	<2 UJ	<2 U	<2 U	<2 U	<2 U	<2 U
Chrysene	218-01-9	**0.002**	ug/l	<0.1 U	**0.03 J**	<0.1 U	**0.12**	<0.1 U	<0.1 U	<0.1 U	**0.06 J**	**0.03 J**
Dibenz(a,h)anthracene	53-70-3	NS	ug/l	<0.1 U	0.03 J	<0.1 U	0.05 J	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Dibenzofuran	132-64-9	NS	ug/l	<2 U	<2 U	<2 U	<2 UJ	<2 U	<2 U	<2 U	<2 U	<2 U
Dibutyl phthalate	84-74-2	50	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
Diethyl phthalate	84-66-2	50	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
Dimethyl phthalate	131-11-3	50	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
Dioctyl phthalate	117-84-0	50	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
Fluoranthene	206-44-0	50	ug/l	0.03 J	0.07 J	0.05 J	0.06 J	0.07 J	<0.1 U	<0.1 U	0.14	0.15
Fluorene	86-73-7	50	ug/l	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	0.14
Hexachlorobenzene	118-74-1	0.04	ug/l	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U
Hexachlorobutadiene	87-68-3	0.5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Hexachlorocyclopentadiene	77-47-4	5	ug/l	<20 U	<20 U	<20 U	<20 UJ	<20 U	<20 U	<20 U	<20 U	<20 U
Hexachloroethane	67-72-1	5	ug/l	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.002**	ug/l	<0.1 U	**0.04 J**	<0.1 U	**0.11**	<0.1 U	<0.1 U	<0.1 U	**0.03 J**	<0.1 U
Isophorone	78-59-1	50	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
Naphthalene	91-20-3	**10**	ug/l	0.07 J	<0.1 U	<0.1 U	<0.1 U	<0.1 U	0.1 J	1.3	<0.1 U	0.17
Nitrobenzene	98-95-3	0.4	ug/l	<2 U	<2 U	<2 U	<2 UJ	<2 U	<2 U	<2 U	<2 U	<2 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	ug/l	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
n-Nitrosodiphenylamine	86-30-6	50	ug/l	<2 U	<2 U	<2 U	<2 UJ	<2 U	<2 U	<2 U	<2 U	<2 U
Pentachlorophenol	87-86-5	1	ug/l	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U
Phenanthrene	85-01-8	50	ug/l	0.02 J	0.06 J	0.03 J	<0.1 U	0.03 J	0.03 J	0.06 J	0.12	0.27
Phenol	108-95-2	**1**	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Pyrene	129-00-0	50	ug/l	0.03 J	0.07 J	0.04 J	0.07 J	0.06 J	<0.1 U	<0.1 U	0.17	0.12

Table 1C
Remedial Investigation Groundwater Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No. 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC SGVs	Location	MW19	MW21	MW26	MW27	MW28	MW29	MW30	MW31	MW32
			Sample Name	MW19_060923	MW21_060923	MW26_060923	MW27_060723	MW28_060923	MW29_060723	MW30_060723	MW31_060723	MW32_060723
			Sample Date	06/09/2023	06/09/2023	06/09/2023	06/07/2023	06/09/2023	06/07/2023	06/07/2023	06/07/2023	06/07/2023
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides												
4,4'-DDD	72-54-8	0.3	ug/l	<0.029 U	<0.029 U	<0.029 U	0.022 J	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U
4,4'-DDE	72-55-9	0.2	ug/l	<0.029 U	<0.029 U	<0.029 U	0.003 J	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U
4,4'-DDT	50-29-3	0.2	ug/l	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U
Aldrin	309-00-2	0	ug/l	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.01	ug/l	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U
Alpha Chlordane	5103-71-9	NS	ug/l	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U
Alpha Endosulfan	959-98-8	NS	ug/l	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.04	ug/l	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U
Beta Endosulfan	33213-65-9	NS	ug/l	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U
Chlordane (alpha and gamma)	57-74-9	0.05	ug/l	<0.143 U	<0.143 U	<0.143 U	<0.143 U	<0.143 U	<0.143 U	<0.143 U	<0.143 U	<0.143 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	ug/l	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U
Dieldrin	60-57-1	0.004	ug/l	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U
Endosulfan Sulfate	1031-07-8	NS	ug/l	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U
Endrin	72-20-8	0	ug/l	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U
Endrin Aldehyde	7421-93-4	5	ug/l	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U
Endrin Ketone	53494-70-5	5	ug/l	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U	<0.029 U
Gamma Bhc (Lindane)	58-89-9	0.05	ug/l	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U
Gamma Chlordane (Trans)	5103-74-2	NS	ug/l	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U
Heptachlor	76-44-8	0.04	ug/l	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U
Heptachlor Epoxide	1024-57-3	0.03	ug/l	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U	<0.014 U
Methoxychlor	72-43-5	35	ug/l	<0.143 U	<0.143 U	<0.143 U	<0.143 U	<0.143 U	<0.143 U	<0.143 U	<0.143 U	<0.143 U
Toxaphene	8001-35-2	0.06	ug/l	<0.143 U	<0.143 U	<0.143 U	<0.143 U	<0.143 U	<0.143 U	<0.143 U	<0.143 U	<0.143 U
Herbicides												
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	35	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	50	ug/l	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
Silvex (2,4,5-Tp)	93-72-1	0.26	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
Polychlorinated Biphenyl												
PCB-1016 (Aroclor 1016)	12674-11-2	NS	ug/l	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	ug/l	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	ug/l	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	ug/l	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	ug/l	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	ug/l	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	ug/l	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U
PCB-1262 (Aroclor 1262)	37324-23-5	NS	ug/l	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U
PCB-1268 (Aroclor 1268)	11100-14-4	NS	ug/l	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U
Total PCBs	1336-36-3	0.09	ug/l	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U	<0.071 U
Metals - Dissolved												
Aluminum	7429-90-5	NS	ug/l	<100 U	11.8	12.8	<10 U	16.5	<10 U	<10 U	<10 U	5.42 J
Antimony	7440-36-0	3	ug/l	<40 U	<4 U	0.62 J	<4 U	1.29 J	0.61 J	0.57 J	1.05 J	<4 U
Arsenic	7440-38-2	**25**	ug/l	**28.75**	3.53	1.71	5.95	6.42	1.78	3.38	3.17	1.46
Barium	7440-39-3	1000	ug/l	39.98	9.85	11.09	28.72	8.67	8.18	12.72	8.26	11.63
Beryllium	7440-41-7	3	ug/l	<5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Cadmium	7440-43-9	5	ug/l	<2 U	<0.2 U	<0.2 U	0.13 J	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Calcium	7440-70-2	NS	ug/l	77,500	17,300	21,800	187,000	46,200	104,000	150,000	137,000	86,800
Chromium, Total	7440-47-3	50	ug/l	<10 U	0.51 J	0.67 J	0.82 J	0.73 J	0.47 J	0.72 J	0.33 J	0.39 J
Cobalt	7440-48-4	NS	ug/l	<5 U	<0.5 U	0.17 J	1.17	0.17 J	0.57	0.3 J	1.08	<0.5 U
Copper	7440-50-8	200	ug/l	<10 U	0.71 J	1.58	1.18	1.86	1.8	1.04	1.76	0.64 J
Iron	7439-89-6	**300**	ug/l	**3,350**	**871**	153	**8,920**	<50 U	130	**6,280**	**480**	**2,350**
Lead	7439-92-1	25	ug/l	<10 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
Magnesium	7439-95-4	**35000**	ug/l	**102,000**	1,340	3,120	9,210	4,290	15,200	19,600	12,400	**44,500**
Manganese	7439-96-5	300	ug/l	143.4	41.79	20.41	73.22	12.93	118.9	159.2	40.25	141.2
Mercury	7439-97-6	0.7	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Nickel	7440-02-0	100	ug/l	<20 U	<2 U	0.98 J	4.35	1.19 J	7.36	3.35	8.01	0.82 J
Potassium	7440-09-7	NS	ug/l	49,200	1,410	2,820	5,000	7,260	11,500	17,800	7,710	29,400
Selenium	7782-49-2	10	ug/l	<50 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Silver	7440-22-4	50	ug/l	<4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U
Sodium	7440-23-5	**20000**	ug/l	**1,340,000**	15,800	16,000	**34,700**	**71,100**	**56,200**	**93,700**	**40,500**	**126,000**
Thallium	7440-28-0	0.5	ug/l	<10 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
Vanadium	7440-62-2	NS	ug/l	<50 U	<5 U	1.92 J	1.89 J	6.22	3.55 J	1.91 J	18.8	<5 U
Zinc	7440-66-6	2000	ug/l	45.63 J	<10 U	30.89	221.8	<10 U	14.69	47.02	7.73 J	<10 U

Table 1C
Remedial Investigation Groundwater Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No. 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC SGVs	Location	MW19	MW21	MW26	MW27	MW28	MW29	MW30	MW31	MW32
			Sample Name	MW19_060923	MW21_060923	MW26_060923	MW27_060723	MW28_060923	MW29_060723	MW30_060723	MW31_060723	MW32_060723
			Sample Date	06/09/2023	06/09/2023	06/09/2023	06/07/2023	06/09/2023	06/07/2023	06/07/2023	06/07/2023	06/07/2023
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result
Metals - Total												
Aluminum	7429-90-5	NS	ug/l	63	75.6	35.7	62.7	24.9	127	16.4	19.8	140
Antimony	7440-36-0	3	ug/l	1.82 J	<4 U	0.48 J	0.71 J	0.88 J	0.46 J	0.46 J	1.07 J	<4 U
Arsenic	7440-38-2	**25**	ug/l	**35.3**	3.97	1.75	6.33	6.23	1.94	3.68	3.36	1.93
Barium	7440-39-3	1000	ug/l	26.63	8.76	9.17	23.68	6.69	7.93	13.04	7.94	11.5
Beryllium	7440-41-7	3	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Cadmium	7440-43-9	5	ug/l	<0.2 U	<0.2 U	<0.2 U	0.07 J	<0.2 U	<0.2 U	0.06 J	<0.2 U	<0.2 U
Calcium	7440-70-2	NS	ug/l	46,800	15,400	21,000	157,000	43,500	117,000	175,000	145,000	100,000
Chromium, Hexavalent	18540-29-9	50	ug/l	<50 U	<10 U	<10 U	3 J	<10 U	3 J	3 J	3 J	3 J
Chromium, Total	7440-47-3	NS	ug/l	1.2	0.61 J	0.39 J	1.65	0.69 J	1.77	0.84 J	0.47 J	1.18
Chromium, Trivalent	16065-83-1	NS	ug/l	<50 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
Cobalt	7440-48-4	NS	ug/l	0.21 J	<0.5 U	0.18 J	1.17	0.22 J	0.78	0.41 J	1.46	0.27 J
Copper	7440-50-8	200	ug/l	1.26	0.43 J	0.69 J	0.79 J	0.62 J	1.76	1.16	2.03	0.84 J
Cyanide	57-12-5	200	ug/l	2 J	1 J	<5 U	2 J	2 J	<5 U	<5 U	2 J	1 J
Iron	7439-89-6	**300**	ug/l	**1,580**	**952**	181	**10,700**	77.9	**772**	**8,140**	**736**	**3,040**
Lead	7439-92-1	**25**	ug/l	1.02	0.46 J	<1 U	0.71 J	<1 U	<1 U	<1 U	<1 U	0.46 J
Magnesium	7439-95-4	**35000**	ug/l	**40,600**	1,220	2,920	7,570	3,680	16,100	22,300	13,300	**44,400**
Manganese	7439-96-5	300	ug/l	72.8	37.58	18.39	82.06	15.71	141.7	200.2	52.2	186.4
Mercury	7439-97-6	0.7	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Nickel	7440-02-0	100	ug/l	2.48	<2 U	1.06 J	3.59 J	1.1 J	9.24	4.02 J	9.19	<2 U
Potassium	7440-09-7	NS	ug/l	26,600	1,550	2,910	5,480	6,750	13,100	22,400	8,990	32,700
Selenium	7782-49-2	10	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Silver	7440-22-4	50	ug/l	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U	<0.4 U
Sodium	7440-23-5	**20000**	ug/l	**650,000**	17,000	15,600	**29,800**	**55,600**	**40,800**	**77,900**	**31,200**	**95,500**
Thallium	7440-28-0	0.5	ug/l	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
Vanadium	7440-62-2	NS	ug/l	4.82 J	<5 U	2.07 J	2.55 J	5.82	3.58 J	2.23 J	18.41	<5 U
Zinc	7440-66-6	2000	ug/l	39.93	<10 U	28.2	169.6	<10 U	18.72	59.14	9.28 J	<10 U
Perfluorooctanoic acids												
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	763051-92-9	NS	ug/l	<0.00611 U	<0.00611 U	<0.00617 U	<0.00607 U	<0.00611 U	<0.00644 U	<0.00625 U	<0.00643 U	<0.00678 U
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	ug/l	<0.00611 U	<0.00611 UJ	<0.00617 UJ	<0.00607 UJ	<0.00611 UJ	<0.00644 UJ	<0.00625 UJ	<0.00643 UJ	<0.00678 UJ
3:3 FTCA	356-02-5	NS	ug/l	<0.00763 U	<0.00764 U	<0.00771 U	<0.00759 U	<0.00764 U	<0.00805 U	<0.00781 U	<0.00804 U	<0.00848 U
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	NS	ug/l	<0.00611 U	<0.00611 U	<0.00617 U	<0.00607 U	<0.00611 U	<0.00644 U	<0.00625 U	<0.00643 U	<0.00678 U
5:3 FTCA	914637-49-3	NS	ug/l	<0.0382 U	<0.0382 U	<0.0386 U	<0.038 U	<0.0382 U	<0.0403 U	<0.039 U	<0.0402 U	<0.0424 U
7:3 FTCA	812-70-4	NS	ug/l	<0.0382 U	<0.0382 U	<0.0386 U	<0.038 U	<0.0382 U	<0.0403 U	<0.039 U	<0.0402 U	<0.0424 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid	756426-58-1	NS	ug/l	<0.00611 U	<0.00611 U	<0.00617 U	<0.00607 U	<0.00611 U	<0.00644 U	<0.00625 U	<0.00643 U	<0.00678 U
N-ethyl perfluorooctane- sulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	ug/l	<0.00153 U	0.000994 J	<0.00154 U	<0.00152 U	<0.00153 U	<0.00161 U	<0.00156 U	<0.00161 U	<0.0017 U
N-ethylperfluorooctane sulfonamide	4151-50-2	NS	ug/l	<0.00153 U	<0.00153 U	<0.00154 U	<0.00152 U	<0.00153 U	<0.00161 U	<0.00156 U	<0.00161 U	<0.0017 U
N-ethylperfluorooctane sulfonamidoe	1691-99-2	NS	ug/l	<0.0153 U	<0.0153 U	<0.0154 U	<0.0152 U	<0.0153 U	<0.0161 U	<0.0156 U	<0.0161 U	<0.017 U
N-methyl perfluorooctane- sulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	ug/l	<0.00153 U	<0.00153 U	<0.00154 U	<0.00152 U	<0.00153 U	<0.00161 U	<0.00156 U	<0.00161 U	<0.0017 U
N-methylperfluorooctane sulfonamide	31506-32-8	NS	ug/l	<0.00153 U	<0.00153 U	<0.00154 U	<0.00152 U	<0.00153 U	<0.00161 U	<0.00156 U	<0.00161 U	<0.0017 U
N-methylperfluorooctanesulfonamidol	24448-09-7	NS	ug/l	<0.0153 U	<0.0153 U	<0.0154 U	<0.0152 U	<0.0153 U	<0.0161 U	<0.0156 U	<0.0161 U	<0.017 U
Nonafluoro-3,6-dioxaheptanoic acid	151772-58-6	NS	ug/l	<0.00305 U	<0.00306 U	<0.00308 U	<0.00304 U	<0.00306 U	<0.00322 U	<0.00312 U	<0.00322 U	<0.00339 U
Perfluoro(2-ethoxyethane)sulfonic acid	113507-82-7	NS	ug/l	<0.00305 U	<0.00306 U	<0.00308 U	<0.00304 U	<0.00306 U	<0.00322 U	<0.00312 U	<0.00322 U	<0.00339 U
Perfluoro-3-methoxypropanoic acid	377-73-1	NS	ug/l	<0.00305 U	<0.00306 U	<0.00308 U	<0.00304 U	<0.00306 U	<0.00322 U	<0.00312 U	<0.00322 U	<0.00339 U
Perfluoro-4-methoxybutanoic acid	863090-89-5	NS	ug/l	<0.00305 U	<0.00306 U	<0.00308 U	<0.00304 U	<0.00306 U	<0.00322 U	<0.00312 U	<0.00322 U	<0.00339 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	ug/l	<0.00153 U	0.000611 J	0.00123 J	0.00288	0.00191	0.0103	0.00984	0.0041	0.00898
Perfluorobutanoic acid (PFBA)	375-22-4	NS	ug/l	0.0087	0.00512 J	0.00486 J	0.00942	0.00779	0.0262	0.0263	0.00941	0.0175
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	ug/l	<0.00153 U	<0.00153 U	<0.00154 U	<0.00152 U	<0.00153 U	<0.00161 U	<0.00156 U	<0.00161 U	<0.0017 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	ug/l	0.000763 J	0.0013 J	0.000771 J	0.00121 J	0.00114 J	0.00169	0.00102 J	0.00169	0.00119 J
Perfluorododecanesulfonic Acid (PFDOS)	79780-39-5	NS	ug/l	<0.00153 U	<0.00153 U	<0.00154 U	<0.00152 U	<0.00153 U	<0.00161 U	<0.00156 U	<0.00161 U	<0.0017 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	ug/l	<0.00153 U	<0.00153 U	<0.00154 U	<0.00152 U	<0.00153 U	<0.00161 U	<0.00156 U	<0.00161 U	<0.0017 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	ug/l	<0.00153 U	<0.00153 U	<0.00154 U	0.000987 J	0.000458 J	0.00105 J	0.00125 J	0.00137 J	<0.0017 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	ug/l	0.00298	0.0016	0.00162	0.00235	0.00252	0.00942	0.00929	0.00394	0.0061
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	ug/l	0.000534 J	<0.00153 U	0.000463 J	0.0019	0.00191	0.00161	0.00414	0.00386	0.00195
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	ug/l	0.0192	0.00764	0.00624	0.00729	0.00947	0.0322	0.0286	0.00651	0.0174
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	ug/l	<0.00153 U	<0.00153 U	<0.00154 U	<0.00152 U	<0.00153 U	<0.00161 U	<0.00156 U	<0.00161 U	<0.0017 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	ug/l	0.00183	0.000841 J	0.00054 J	0.00197	0.00145 J	0.00813	0.00289	0.00635	0.00229
Perfluorooctanesulfonamide (FOSA)	754-91-6	NS	ug/l	<0.00153 U	0.00107 J	<0.00154 U	<0.00152 U	0.000917 J	<0.00161 U	<0.00156 U	<0.00161 U	<0.0017 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.0027**	ug/l	**0.0183**	**0.00795**	**0.0121**	**0.0589**	**0.11**	**0.0771**	**0.0281**	**0.0775**	**0.0106**
Perfluorooctanoic Acid (PFOA)	335-67-1	**0.0067**	ug/l	0.00359	0.00267	0.00224	**0.00744**	0.00611	**0.0189**	**0.0617**	**0.0221**	**0.0305**
Perfluoropentanesulfonic Acid	2706-91-4	NS	ug/l	<0.00153 U	<0.00153 U	<0.00154 U	<0.00152 U	0.000306 J	<0.00161 U	0.000546 J	<0.00161 U	<0.0017 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	ug/l	0.0189	0.0081	0.00748	0.0122	0.0111	0.0424	0.0408	0.00997	0.0171
Perfluorotetradecanoic Acid (PFTA)	376-06-7	NS	ug/l	<0.00153 U	<0.00153 U	<0.00154 U	<0.00152 U	<0.00153 U	<0.00161 U	<0.00156 U	<0.00161 U	<0.0017 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	ug/l	<0.00153 U	<0.00153 U	<0.00154 U	<0.00152 U	<0.00153 U	<0.00161 U	<0.00156 U	<0.00161 U	<0.0017 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	ug/l	<0.00153 U	<0.00153 U	<0.00154 U	<0.00152 U	<0.00153 U	<0.00161 U	<0.00156 U	<0.00161 U	<0.0017 U
Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate (8:2) (8:2FTS)	39108-34-4	NS	ug/l	<0.00611 U	<0.00611 U	<0.00617 U	<0.00607 U	<0.00611 U	<0.00644 UJ	<0.00625 U	<0.00643 U	<0.00678 U
Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2) (6:2FTS)	27619-97-2	NS	ug/l	<0.00611 U	<0.00611 U	<0.00617 U	<0.00607 U	<0.00611 U	<0.00644 UJ	<0.00625 U	<0.00643 U	<0.00678 UJ
Tetrafluoro-2- (heptafluoropropoxy) propanoic Acid	13252-13-6	NS	ug/l	0.00496 J	0.00405 J	<0.00617 U	0.00304 J	0.00512 J	0.00362 J	0.00812	0.00193 J	0.00297 J

Table 1C
Remedial Investigation Groundwater Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No. 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC SGVs	Location	MW35	MW35_E5	MW35_N3	MW35_SW3	MW36_S2	MW37	MW37	MW38	MW41
			Sample Name	MW35_060723	MW35_E5_060723	MW35_N3_060723	MW35_SW3_060723	MW36_S2_060623	MW37_060623	GWDUP01_060623	MW38_060623	MW41_060623
			Sample Date	06/07/2023	06/07/2023	06/07/2023	06/07/2023	06/06/2023	06/06/2023	06/06/2023	06/06/2023	06/06/2023
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds												
1,1,1,2-Tetrachloroethane	630-20-6	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,1,1-Trichloroethane	71-55-6	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,1,2,2-Tetrachloroethane	79-34-5	5	ug/l	<5 U	<1.2 U	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1,2-Trichloroethane	79-00-5	1	ug/l	<15 U	<3.8 U	<7.5 U	<1.5 U	<1.5 U	<1.5 U	<1.5 U	<1.5 U	<1.5 U
1,1-Dichloroethane	75-34-3	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,1-Dichloroethene	75-35-4	5	ug/l	<5 U	<1.2 U	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,1-Dichloropropene	563-58-6	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,2,3-Trichlorobenzene	87-61-6	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,2,3-Trichloropropane	96-18-4	0.04	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,2,4,5-Tetramethylbenzene	95-93-2	**5**	ug/l	**95**	**19**	**13**	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
1,2,4-Trichlorobenzene	120-82-1	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,2,4-Trimethylbenzene	95-63-6	**5**	ug/l	**1,800**	**180**	**27**	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,2-Dibromo-3-Chloropropane	96-12-8	0.04	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.0006	ug/l	<20 U	<5 U	<10 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
1,2-Dichlorobenzene	95-50-1	3	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,2-Dichloroethane	107-06-2	0.6	ug/l	<5 U	<1.2 U	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,2-Dichloropropane	78-87-5	1	ug/l	<10 U	<2.5 U	<5 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	**5**	ug/l	**400**	**27**	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,3-Dichlorobenzene	541-73-1	3	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,3-Dichloropropane	142-28-9	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,4-Dichlorobenzene	106-46-7	3	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,4-Diethyl Benzene	105-05-5	NS	ug/l	240	26	<10 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.35	ug/l	<2,500 UJ	<620 UJ	<1,200 UJ	<250 UJ	<250 U	<250 U	<250 U	<250 U	<250 U
2,2-Dichloropropane	594-20-7	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
2-Chlorotoluene	95-49-8	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
2-Hexanone (MBK)	591-78-6	50	ug/l	<50 U	<12 U	<25 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
4-Chlorotoluene	106-43-4	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
4-Ethyltoluene	622-96-8	NS	ug/l	1,200	81	<10 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
Acetone	67-64-1	50	ug/l	<50 U	<12 U	<25 U	<5 U	<5 U	<5 U	<5 U	<5 U	2.8 J
Acrylonitrile	107-13-1	5	ug/l	<50 U	<12 U	<25 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Benzene	71-43-2	**1**	ug/l	**4.6 J**	**3.5**	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Bromobenzene	108-86-1	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Bromochloromethane	74-97-5	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Bromodichloromethane	75-27-4	50	ug/l	<5 U	<1.2 U	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Bromoform	75-25-2	50	ug/l	<20 U	<5 U	<10 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
Bromomethane	74-83-9	5	ug/l	<25 UJ	<6.2 UJ	<12 UJ	<2.5 UJ	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Carbon Disulfide	75-15-0	60	ug/l	<50 U	<12 U	<25 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Carbon Tetrachloride	56-23-5	5	ug/l	<5 U	<1.2 U	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Chlorobenzene	108-90-7	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Chloroethane	75-00-3	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Chloroform	67-66-3	7	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Chloromethane	74-87-3	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Cis-1,2-Dichloroethene	156-59-2	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Cis-1,3-Dichloropropene	10061-01-5	0.4	ug/l	<5 U	<1.2 U	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Cymene	99-87-6	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Dibromochloromethane	124-48-1	50	ug/l	<5 U	<1.2 U	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Dibromomethane	74-95-3	5	ug/l	<50 U	<12 U	<25 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Dichlorodifluoromethane	75-71-8	5	ug/l	<50 U	<12 U	<25 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Diethyl Ether (Ethyl Ether)	60-29-7	NS	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Ethylbenzene	100-41-4	**5**	ug/l	**360**	**64**	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Hexachlorobutadiene	87-68-3	0.5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Isopropylbenzene (Cumene)	98-82-8	**5**	ug/l	**56**	**10**	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
M,P-Xylene	179601-23-1	**5**	ug/l	**1,800**	**160**	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	50	ug/l	<50 U	<12 U	<25 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	ug/l	<50 U	<12 U	<25 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Methylene Chloride	75-09-2	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Naphthalene	91-20-3	**10**	ug/l	**350 J**	**45 J**	<12 UJ	1.5 J	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
n-Butylbenzene	104-51-8	**5**	ug/l	**23 J**	3.8 J	<12 U	<2.5 U	<2.5 U	1.1 J	0.98 J	<2.5 U	<2.5 U
n-Propylbenzene	103-65-1	**5**	ug/l	**170**	**29**	**9.2 J**	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	**5**	ug/l	**760**	**120**	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Sec-Butylbenzene	135-98-8	**5**	ug/l	**11 J**	2.8 J	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Styrene	100-42-5	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
T-Butylbenzene	98-06-6	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Tert-Butyl Methyl Ether	1634-04-4	10	ug/l	<25 U	3.5 J	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Tetrachloroethene (PCE)	127-18-4	5	ug/l	<5 U	<1.2 U	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Toluene	108-88-3	**5**	ug/l	**31**	**28**	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Total Xylenes	1330-20-7	**5**	ug/l	**2,600**	**280**	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	0.4	ug/l	<5 U	<1.2 U	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Trans-1,2-Dichloroethene	156-60-5	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Trans-1,3-Dichloropropene	10061-02-6	0.4	ug/l	<5 U	<1.2 U	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Trans-1,4-Dichloro-2-Butene	110-57-6	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Trichloroethene (TCE)	79-01-6	5	ug/l	<5 U	<1.2 U	<2.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Trichlorofluoromethane	75-69-4	5	ug/l	<25 U	<6.2 U	<12 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Vinyl Acetate	108-05-4	NS	ug/l	<50 U	<12 U	<25 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Vinyl Chloride	75-01-4	2	ug/l	<10 U	<2.5 U	<5 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U

Table 1C
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Analyte	CAS Number	NYSDEC SGVs	Location	MW35	MW35_E5	MW35_N3	MW35_SW3	MW36_S2	MW37	MW37	MW38	MW41
			Sample Name	MW35_060723	MW35_E5_060723	MW35_N3_060723	MW35_SW3_060723	MW36_S2_060623	MW37_060623	GWDUP01_060623	MW38_060623	MW41_060623
			Sample Date	06/07/2023	06/07/2023	06/07/2023	06/07/2023	06/06/2023	06/06/2023	06/06/2023	06/06/2023	06/06/2023
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds												
1,2,4,5-Tetrachlorobenzene	95-94-3	5	ug/l	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
1,2,4-Trichlorobenzene	120-82-1	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
1,2-Dichlorobenzene	95-50-1	3	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
1,3-Dichlorobenzene	541-73-1	3	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
1,4-Dichlorobenzene	106-46-7	3	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.35	ug/l	0.12 J	NA	NA	NA	NA	<0.17 U	0.0812 J	<0.144 U	NA
2,4,5-Trichlorophenol	95-95-4	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
2,4,6-Trichlorophenol	88-06-2	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
2,4-Dichlorophenol	120-83-2	1	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
2,4-Dimethylphenol	105-67-9	**1**	ug/l	**3.9 J**	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
2,4-Dinitrophenol	51-28-5	1	ug/l	<20 U	<20 U	<20 U	<20 U	<20 U	<20 U	<20 U	<20 U	<20 U
2,4-Dinitrotoluene	121-14-2	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
2,6-Dinitrotoluene	606-20-2	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
2-Chloronaphthalene	91-58-7	10	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
2-Chlorophenol	95-57-8	NS	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
2-Methylnaphthalene	91-57-6	NS	ug/l	45	6.1	0.03 J	<0.1 U	0.02 J	<0.1 U	<0.1 U	<0.1 U	<0.1 U
2-Methylphenol (o-Cresol)	95-48-7	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
2-Nitroaniline	88-74-4	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
2-Nitrophenol	88-75-5	NS	ug/l	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	NS	ug/l	7.7	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
3,3'-Dichlorobenzidine	91-94-1	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
3-Nitroaniline	99-09-2	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	ug/l	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
4-Chloro-3-Methylphenol	59-50-7	NS	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
4-Chloroaniline	106-47-8	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5 UJ	<5 UJ	<5 UJ	<5 UJ	<5 UJ
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
4-Nitroaniline	100-01-6	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
4-Nitrophenol	100-02-7	NS	ug/l	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
Acenaphthene	83-32-9	20	ug/l	0.34	0.19	<0.1 U	<0.1 U	0.02 J	0.02 J	<0.1 U	<0.1 U	<0.1 U
Acenaphthylene	208-96-8	NS	ug/l	0.1	<0.1 U	<0.1 U	<0.1 U	<0.1 U	0.02 J	<0.1 U	<0.1 U	<0.1 U
Acetophenone	98-86-2	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Anthracene	120-12-7	50	ug/l	0.14	0.07 J	<0.1 U	<0.1 U	0.03 J	0.05 J	0.03 J	<0.1 U	0.02 J
Benzo(a)anthracene	56-55-3	**0.002**	ug/l	**0.07 J**	**0.04 J**	<0.1 U	**0.03 J**	**0.02 J**	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Benzo(a)pyrene	50-32-8	**0**	ug/l	**0.06 J**	**0.02 J**	<0.1 U	**0.03 J**	**0.02 J**	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Benzo(b)fluoranthene	205-99-2	**0.002**	ug/l	**0.08 J**	**0.03 J**	<0.1 U	**0.03 J**	**0.02 J**	**0.02 J**	<0.1 U	<0.1 U	<0.1 U
Benzo(g,h,i)Perylene	191-24-2	NS	ug/l	0.04 J	<0.1 U	<0.1 U	<0.1 U	0.02 J	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Benzo(k)fluoranthene	207-08-9	**0.002**	ug/l	**0.03 J**	**0.01 J**	<0.1 U	**0.02 J**	**0.01 J**	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Benzoic Acid	65-85-0	NS	ug/l	<50 U	<50 U	<50 U	<50 U	<50 UJ	<50 UJ	<50 UJ	<50 UJ	<50 UJ
Benzyl Alcohol	100-51-6	NS	ug/l	<2 U	<2 U	<2 U	<2 U	<2 UJ	<2 UJ	<2 UJ	<2 UJ	<2 UJ
Benzyl Butyl Phthalate	85-68-7	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Biphenyl (Diphenyl)	92-52-4	5	ug/l	0.79 J	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
Bis(2-chloroethoxy) methane	111-91-1	5	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	1	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
Bis(2-chloroisopropyl) ether	108-60-1	5	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
Bis(2-ethylhexyl) phthalate	117-81-7	5	ug/l	<3 U	<3 U	<3 U	<3 U	<3 U	<3 U	<3 U	<3 U	<3 U
Carbazole	86-74-8	NS	ug/l	0.63 J	0.52 J	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
Chrysene	218-01-9	**0.002**	ug/l	**0.06 J**	**0.03 J**	<0.1 U	**0.03 J**	**0.02 J**	**0.01 J**	<0.1 U	<0.1 U	<0.1 U
Dibenz(a,h)anthracene	53-70-3	NS	ug/l	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Dibenzofuran	132-64-9	NS	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
Dibutyl phthalate	84-74-2	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Diethyl phthalate	84-66-2	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Dimethyl phthalate	131-11-3	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Dioctyl phthalate	117-84-0	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Fluoranthene	206-44-0	50	ug/l	0.23	0.14	<0.1 U	<0.1 U	0.09 J	0.05 J	0.04 J	<0.1 U	0.02 J
Fluorene	86-73-7	50	ug/l	0.38	0.2	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Hexachlorobenzene	118-74-1	0.04	ug/l	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U
Hexachlorobutadiene	87-68-3	0.5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Hexachlorocyclopentadiene	77-47-4	5	ug/l	<20 U	<20 U	<20 U	<20 U	<20 U	<20 U	<20 U	<20 U	<20 U
Hexachloroethane	67-72-1	5	ug/l	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.002**	ug/l	**0.04 J**	<0.1 U	<0.1 U	<0.1 U	**0.02 J**	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Isophorone	78-59-1	50	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Naphthalene	91-20-3	**10**	ug/l	**95**	**21**	0.31	<0.1 U	0.06 J	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Nitrobenzene	98-95-3	0.4	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	ug/l	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
n-Nitrosodiphenylamine	86-30-6	50	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
Pentachlorophenol	87-86-5	1	ug/l	<0.8 U	<0.8 U	<0.8 U	<0.8 U	0.06 J	<0.8 U	<0.8 U	<0.8 U	<0.8 U
Phenanthrene	85-01-8	50	ug/l	0.55	0.34	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Phenol	108-95-2	**1**	ug/l	**13**	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Pyrene	129-00-0	50	ug/l	0.23	0.12	<0.1 U	<0.1 U	0.09 J	0.05 J	0.03 J	<0.1 U	0.02 J

Table 1C
Remedial Investigation Groundwater Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No. 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC SGVs	Location	MW35	MW35_E5	MW35_N3	MW35_SW3	MW36_S2	MW37	MW37	MW38	MW41
			Sample Name	MW35_060723	MW35_E5_060723	MW35_N3_060723	MW35_SW3_060723	MW36_S2_060623	MW37_060623	GWDUP01_060623	MW38_060623	MW41_060623
			Sample Date	06/07/2023	06/07/2023	06/07/2023	06/07/2023	06/06/2023	06/06/2023	06/06/2023	06/06/2023	06/06/2023
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides												
4,4'-DDD	72-54-8	0.3	ug/l	<0.029 U	NA	NA	NA	NA	<0.029 U	<0.029 U	<0.029 U	NA
4,4'-DDE	72-55-9	0.2	ug/l	<0.029 U	NA	NA	NA	NA	<0.029 U	<0.029 U	<0.029 U	NA
4,4'-DDT	50-29-3	0.2	ug/l	<0.029 U	NA	NA	NA	NA	<0.029 U	<0.029 U	<0.029 U	NA
Aldrin	309-00-2	0	ug/l	<0.014 U	NA	NA	NA	NA	<0.014 U	<0.014 U	<0.014 U	NA
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.01	ug/l	<0.014 U	NA	NA	NA	NA	<0.014 U	<0.014 U	<0.014 U	NA
Alpha Chlordane	5103-71-9	NS	ug/l	<0.014 U	NA	NA	NA	NA	<0.014 U	<0.014 U	<0.014 U	NA
Alpha Endosulfan	959-98-8	NS	ug/l	<0.014 U	NA	NA	NA	NA	<0.014 U	<0.014 U	<0.014 U	NA
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.04	ug/l	<0.014 U	NA	NA	NA	NA	<0.014 U	<0.014 U	<0.014 U	NA
Beta Endosulfan	33213-65-9	NS	ug/l	<0.029 U	NA	NA	NA	NA	<0.029 U	<0.029 U	<0.029 U	NA
Chlordane (alpha and gamma)	57-74-9	0.05	ug/l	<0.143 U	NA	NA	NA	NA	<0.143 U	<0.143 U	<0.143 U	NA
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	ug/l	<0.014 U	NA	NA	NA	NA	<0.014 UJ	<0.014 UJ	<0.014 UJ	NA
Dieldrin	60-57-1	0.004	ug/l	<0.029 U	NA	NA	NA	NA	<0.029 U	<0.029 U	<0.029 U	NA
Endosulfan Sulfate	1031-07-8	NS	ug/l	<0.029 U	NA	NA	NA	NA	<0.029 U	<0.029 U	<0.029 U	NA
Endrin	72-20-8	0	ug/l	<0.029 U	NA	NA	NA	NA	<0.029 U	<0.029 U	<0.029 U	NA
Endrin Aldehyde	7421-93-4	5	ug/l	<0.029 U	NA	NA	NA	NA	<0.029 U	<0.029 U	<0.029 U	NA
Endrin Ketone	53494-70-5	5	ug/l	<0.029 U	NA	NA	NA	NA	<0.029 U	<0.029 U	<0.029 U	NA
Gamma Bhc (Lindane)	58-89-9	0.05	ug/l	<0.014 U	NA	NA	NA	NA	<0.014 U	<0.014 U	<0.014 U	NA
Gamma Chlordane (Trans)	5103-74-2	NS	ug/l	<0.014 U	NA	NA	NA	NA	<0.014 U	<0.014 U	<0.014 U	NA
Heptachlor	76-44-8	0.04	ug/l	<0.014 U	NA	NA	NA	NA	<0.014 U	<0.014 U	<0.014 U	NA
Heptachlor Epoxide	1024-57-3	0.03	ug/l	<0.014 U	NA	NA	NA	NA	<0.014 U	<0.014 U	<0.014 U	NA
Methoxychlor	72-43-5	35	ug/l	<0.143 U	NA	NA	NA	NA	<0.143 U	<0.143 U	<0.143 U	NA
Toxaphene	8001-35-2	0.06	ug/l	<0.143 U	NA	NA	NA	NA	<0.143 U	<0.143 U	<0.143 U	NA
Herbicides												
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	35	ug/l	<2 U	NA	NA	NA	NA	<2 U	<2 U	<2 U	NA
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	50	ug/l	<10 U	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA
Silvex (2,4,5-Tp)	93-72-1	0.26	ug/l	<2 U	NA	NA	NA	NA	<2 U	<2 U	<2 U	NA
Polychlorinated Biphenyl												
PCB-1016 (Aroclor 1016)	12674-11-2	NS	ug/l	<0.071 U	NA	NA	NA	NA	<0.071 U	<0.071 U	<0.071 U	NA
PCB-1221 (Aroclor 1221)	11104-28-2	NS	ug/l	<0.071 U	NA	NA	NA	NA	<0.071 U	<0.071 U	<0.071 U	NA
PCB-1232 (Aroclor 1232)	11141-16-5	NS	ug/l	<0.071 U	NA	NA	NA	NA	<0.071 U	<0.071 U	<0.071 U	NA
PCB-1242 (Aroclor 1242)	53469-21-9	NS	ug/l	<0.071 U	NA	NA	NA	NA	<0.071 U	<0.071 U	<0.071 U	NA
PCB-1248 (Aroclor 1248)	12672-29-6	NS	ug/l	<0.071 U	NA	NA	NA	NA	<0.071 U	<0.071 U	<0.071 U	NA
PCB-1254 (Aroclor 1254)	11097-69-1	NS	ug/l	<0.071 U	NA	NA	NA	NA	<0.071 U	<0.071 U	<0.071 U	NA
PCB-1260 (Aroclor 1260)	11096-82-5	NS	ug/l	<0.071 U	NA	NA	NA	NA	<0.071 U	<0.071 U	<0.071 U	NA
PCB-1262 (Aroclor 1262)	37324-23-5	NS	ug/l	<0.071 U	NA	NA	NA	NA	<0.071 U	<0.071 U	<0.071 U	NA
PCB-1268 (Aroclor 1268)	11100-14-4	NS	ug/l	<0.071 U	NA	NA	NA	NA	<0.071 U	<0.071 U	<0.071 U	NA
Total PCBs	1336-36-3	0.09	ug/l	<0.071 U	NA	NA	NA	NA	<0.071 U	<0.071 U	<0.071 U	NA
Metals - Dissolved												
Aluminum	7429-90-5	NS	ug/l	15.1	NA	NA	NA	NA	6.15 J	4.72 J	<10 U	NA
Antimony	7440-36-0	3	ug/l	<4 U	NA	NA	NA	NA	<4 U	<4 U	0.64 J	NA
Arsenic	7440-38-2	**25**	ug/l	2.25	NA	NA	NA	NA	2.75	2.83	3.19	NA
Barium	7440-39-3	1000	ug/l	14.33	NA	NA	NA	NA	15.8	15.42	11.63	NA
Beryllium	7440-41-7	3	ug/l	<0.5 U	NA	NA	NA	NA	<0.5 U	<0.5 U	<0.5 U	NA
Cadmium	7440-43-9	5	ug/l	<0.2 U	NA	NA	NA	NA	<0.2 U	<0.2 U	<0.2 U	NA
Calcium	7440-70-2	NS	ug/l	52,500	NA	NA	NA	NA	115,000	108,000	117,000	NA
Chromium, Total	7440-47-3	50	ug/l	0.69 J	NA	NA	NA	NA	0.58 J	0.55 J	0.21 J	NA
Cobalt	7440-48-4	NS	ug/l	<0.5 U	NA	NA	NA	NA	0.24 J	0.24 J	0.48 J	NA
Copper	7440-50-8	200	ug/l	0.39 J	NA	NA	NA	NA	<1 U	0.42 J	1.61	NA
Iron	7439-89-6	**300**	ug/l	264	NA	NA	NA	NA	**1,450**	**1,080**	264	NA
Lead	7439-92-1	25	ug/l	<1 U	NA	NA	NA	NA	<1 U	<1 U	<1 U	NA
Magnesium	7439-95-4	**35000**	ug/l	7,640	NA	NA	NA	NA	15,600	15,000	21,700 J	NA
Manganese	7439-96-5	300	ug/l	33.81	NA	NA	NA	NA	27.87	24.06	66.65	NA
Mercury	7439-97-6	0.7	ug/l	<0.2 U	NA	NA	NA	NA	<0.2 U	<0.2 U	<0.2 U	NA
Nickel	7440-02-0	100	ug/l	3.46	NA	NA	NA	NA	1.3 J	1.17 J	2.11	NA
Potassium	7440-09-7	NS	ug/l	23,300	NA	NA	NA	NA	24,300	23,200	43,600	NA
Selenium	7782-49-2	10	ug/l	<5 U	NA	NA	NA	NA	<5 U	<5 U	<5 U	NA
Silver	7440-22-4	50	ug/l	<0.4 U	NA	NA	NA	NA	<0.4 U	<0.4 U	<0.4 U	NA
Sodium	7440-23-5	**20000**	ug/l	**122,000**	NA	NA	NA	NA	**212,000**	**227,000**	**226,000**	NA
Thallium	7440-28-0	0.5	ug/l	<1 U	NA	NA	NA	NA	<1 U	<1 U	<1 U	NA
Vanadium	7440-62-2	NS	ug/l	2.88 J	NA	NA	NA	NA	<5 U	<5 U	<5 U	NA
Zinc	7440-66-6	2000	ug/l	<10 U	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA

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Langan Project No. 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC SGVs	Location	MW35	MW35_E5	MW35_N3	MW35_SW3	MW36_S2	MW37	MW37	MW38	MW41
			Sample Name	MW35_060723	MW35_E5_060723	MW35_N3_060723	MW35_SW3_060723	MW36_S2_060623	MW37_060623	GWDUP01_060623	MW38_060623	MW41_060623
			Sample Date	06/07/2023	06/07/2023	06/07/2023	06/07/2023	06/06/2023	06/06/2023	06/06/2023	06/06/2023	06/06/2023
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result
Metals - Total												
Aluminum	7429-90-5	NS	ug/l	760	NA	NA	NA	NA	183 J	9.81 J	6.19 J	NA
Antimony	7440-36-0	3	ug/l	0.43 J	NA	NA	NA	NA	<4 U	<4 U	0.9 J	NA
Arsenic	7440-38-2	**25**	ug/l	3.69	NA	NA	NA	NA	3.71	2.88	3.28	NA
Barium	7440-39-3	1000	ug/l	27.2	NA	NA	NA	NA	16.62	16.48	11.87	NA
Beryllium	7440-41-7	3	ug/l	<0.5 U	NA	NA	NA	NA	<0.5 U	<0.5 U	<0.5 U	NA
Cadmium	7440-43-9	5	ug/l	<0.2 U	NA	NA	NA	NA	<0.2 U	<0.2 U	<0.2 U	NA
Calcium	7440-70-2	NS	ug/l	61,200	NA	NA	NA	NA	117,000	111,000	116,000	NA
Chromium, Hexavalent	18540-29-9	50	ug/l	4 J	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA
Chromium, Total	7440-47-3	NS	ug/l	8.51	NA	NA	NA	NA	2.52 J	0.61 J	0.28 J	NA
Chromium, Trivalent	16065-83-1	NS	ug/l	<10 U	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA
Cobalt	7440-48-4	NS	ug/l	0.74	NA	NA	NA	NA	0.49 J	0.22 J	0.51	NA
Copper	7440-50-8	200	ug/l	10.55	NA	NA	NA	NA	1.02 J	<1 U	1.31 J	NA
Cyanide	57-12-5	200	ug/l	2 J	NA	NA	NA	NA	14	14	3 J	NA
Iron	7439-89-6	**300**	ug/l	**2,290**	NA	NA	NA	NA	**1,880**	**1,450**	**512**	NA
Lead	7439-92-1	**25**	ug/l	**62.46**	NA	NA	NA	NA	1.69	<1 U	<1 U	NA
Magnesium	7439-95-4	**35000**	ug/l	9,130	NA	NA	NA	NA	15,500	15,800	20,000	NA
Manganese	7439-96-5	300	ug/l	60.1	NA	NA	NA	NA	31.72	24.84	66.58	NA
Mercury	7439-97-6	0.7	ug/l	<0.2 U	NA	NA	NA	NA	<0.2 U	<0.2 U	<0.2 U	NA
Nickel	7440-02-0	100	ug/l	7.23	NA	NA	NA	NA	1.89 J	1.07 J	2.24	NA
Potassium	7440-09-7	NS	ug/l	30,400	NA	NA	NA	NA	23,500	24,000	42,200	NA
Selenium	7782-49-2	10	ug/l	1.75 J	NA	NA	NA	NA	<5 U	<5 U	<5 U	NA
Silver	7440-22-4	50	ug/l	<0.4 U	NA	NA	NA	NA	<0.4 U	<0.4 U	<0.4 U	NA
Sodium	7440-23-5	**20000**	ug/l	**102,000**	NA	NA	NA	NA	**193,000**	**230,000**	**214,000**	NA
Thallium	7440-28-0	0.5	ug/l	<1 U	NA	NA	NA	NA	<1 U	<1 U	0.15 J	NA
Vanadium	7440-62-2	NS	ug/l	5.85	NA	NA	NA	NA	2.59 J	<5 U	1.58 J	NA
Zinc	7440-66-6	2000	ug/l	20.46	NA	NA	NA	NA	<10 U	<10 U	<10 U	NA
Perfluorooctanoic acids												
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	763051-92-9	NS	ug/l	<0.00688 U	NA	NA	NA	NA	<0.00644 U	<0.00614 U	<0.00634 U	NA
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	ug/l	<0.00688 UJ	NA	NA	NA	NA	<0.00644 UJ	<0.00614 UJ	<0.00634 UJ	NA
3:3 FTCA	356-02-5	NS	ug/l	<0.0086 U	NA	NA	NA	NA	<0.00805 U	<0.00767 U	<0.00792 U	NA
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	NS	ug/l	<0.00688 U	NA	NA	NA	NA	<0.00644 U	<0.00614 U	<0.00634 U	NA
5:3 FTCA	914637-49-3	NS	ug/l	<0.043 U	NA	NA	NA	NA	<0.0402 U	<0.0384 U	<0.0396 U	NA
7:3 FTCA	812-70-4	NS	ug/l	<0.043 U	NA	NA	NA	NA	<0.0402 U	<0.0384 U	<0.0396 U	NA
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid	756426-58-1	NS	ug/l	<0.00688 U	NA	NA	NA	NA	<0.00644 U	<0.00614 U	<0.00634 U	NA
N-ethyl perfluorooctane- sulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	ug/l	0.00241	NA	NA	NA	NA	<0.00161 U	<0.00153 U	<0.00158 U	NA
N-ethylperfluorooctane sulfonamide	4151-50-2	NS	ug/l	<0.00172 U	NA	NA	NA	NA	<0.00161 U	<0.00153 U	<0.00158 U	NA
N-ethylperfluorooctane sulfonamidoe	1691-99-2	NS	ug/l	<0.0172 U	NA	NA	NA	NA	<0.0161 U	<0.0153 U	<0.0158 U	NA
N-methyl perfluorooctane- sulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	ug/l	0.00138 J	NA	NA	NA	NA	<0.00161 U	<0.00153 U	<0.00158 U	NA
N-methylperfluorooctane sulfonamide	31506-32-8	NS	ug/l	<0.00172 U	NA	NA	NA	NA	<0.00161 U	<0.00153 U	<0.00158 U	NA
N-methylperfluorooctanesulfonamidol	24448-09-7	NS	ug/l	<0.0172 U	NA	NA	NA	NA	<0.0161 U	<0.0153 U	<0.0158 U	NA
Nonafluoro-3,6-dioxaheptanoic acid	151772-58-6	NS	ug/l	<0.00344 U	NA	NA	NA	NA	<0.00322 U	<0.00307 U	<0.00317 U	NA
Perfluoro(2-ethoxyethane)sulfonic acid	113507-82-7	NS	ug/l	<0.00344 U	NA	NA	NA	NA	<0.00322 U	<0.00307 U	<0.00317 U	NA
Perfluoro-3-methoxypropanoic acid	377-73-1	NS	ug/l	<0.00344 U	NA	NA	NA	NA	<0.00322 U	<0.00307 U	<0.00317 U	NA
Perfluoro-4-methoxybutanoic acid	863090-89-5	NS	ug/l	<0.00344 U	NA	NA	NA	NA	<0.00322 U	<0.00307 U	<0.00317 U	NA
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	ug/l	0.00878	NA	NA	NA	NA	0.00877	0.00936	0.00864	NA
Perfluorobutanoic acid (PFBA)	375-22-4	NS	ug/l	0.0135	NA	NA	NA	NA	0.0249	0.0251	0.0179	NA
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	ug/l	<0.00172 U	NA	NA	NA	NA	<0.00161 U	<0.00153 U	<0.00158 U	NA
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	ug/l	0.00353	NA	NA	NA	NA	0.00121 J	0.0013 J	<0.00158 U	NA
Perfluorododecanesulfonic Acid (PFDOS)	79780-39-5	NS	ug/l	<0.00172 U	NA	NA	NA	NA	<0.00161 U	<0.00153 U	<0.00158 U	NA
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	ug/l	<0.00172 U	NA	NA	NA	NA	<0.00161 U	<0.00153 U	<0.00158 U	NA
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	ug/l	0.00103 J	NA	NA	NA	NA	0.000644 J	<0.00153 U	<0.00158 U	NA
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	ug/l	0.00662	NA	NA	NA	NA	0.0103	0.0101	0.014	NA
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	ug/l	0.00516	NA	NA	NA	NA	0.0074	0.00706	0.00554	NA
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	ug/l	0.0197	NA	NA	NA	NA	0.0412	0.0399	0.0337	NA
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	ug/l	<0.00172 U	NA	NA	NA	NA	<0.00161 U	<0.00153 U	<0.00158 U	NA
Perfluorononanoic Acid (PFNA)	375-95-1	NS	ug/l	0.00809	NA	NA	NA	NA	0.00716 J	0.00537 J	0.00372	NA
Perfluorooctanesulfonamide (FOSA)	754-91-6	NS	ug/l	0.00465 J	NA	NA	NA	NA	<0.00161 U	<0.00153 U	<0.00158 U	NA
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.0027**	ug/l	**0.0727**	NA	NA	NA	NA	**0.0205**	**0.0213**	**0.0192**	NA
Perfluorooctanoic Acid (PFOA)	335-67-1	**0.0067**	ug/l	**0.0289**	NA	NA	NA	NA	**0.025**	**0.0262**	**0.0181**	NA
Perfluoropentanesulfonic Acid	2706-91-4	NS	ug/l	0.000516 J	NA	NA	NA	NA	0.00145 J	0.000844 J	0.000951 J	NA
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	ug/l	0.0342	NA	NA	NA	NA	0.0364	0.0364	0.0317	NA
Perfluorotetradecanoic Acid (PFTA)	376-06-7	NS	ug/l	<0.00172 U	NA	NA	NA	NA	<0.00161 U	<0.00153 U	<0.00158 U	NA
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	ug/l	<0.00172 U	NA	NA	NA	NA	<0.00161 U	<0.00153 U	<0.00158 U	NA
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	ug/l	<0.00172 U	NA	NA	NA	NA	<0.00161 U	<0.00153 U	<0.00158 U	NA
Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate (8:2) (8:2FTS)	39108-34-4	NS	ug/l	<0.00688 U	NA	NA	NA	NA	<0.00644 UJ	<0.00614 UJ	<0.00634 UJ	NA
Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2) (6:2FTS)	27619-97-2	NS	ug/l	<0.00688 UJ	NA	NA	NA	NA	<0.00644 UJ	<0.00614 UJ	<0.00634 UJ	NA
Tetrafluoro-2- (heptafluoropropoxy) propanoic Acid	13252-13-6	NS	ug/l	0.00439 J	NA	NA	NA	NA	0.00338 J	0.00314 J	0.00174 J	NA

Table 1C
Remedial Investigation Groundwater Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No. 170747001
BCP Site No. C224398

Notes:
CAS - Chemical Abstract Service
NS - No standard
ug/l - microgram per liter
NA - Not analyzed
RL - Reporting limit
<RL - Not detected

Groundwater sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 Codes, Rules, and Regulations (NYCRR) Part 703.5 and the NYSDEC Technical and Operation Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values for Class GA Water and published addenda (herein collectively referenced as "NYSDEC SGVs").

Qualifiers:

J - The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.

UJ - The analyte was not detected at a level greater than or equal to the RL; however, the reported RL is approximate and may be inaccurate or imprecise.

U - The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the RL or the sample concentration for results impacted by blank contamination.

Exceedance Summary:
10 - Result exceeds NYSDEC SGVs

Table 2
Unrestricted Use Soil Cleanup Objectives
Site Management Plan
1709 Surf Avenue
Brooklyn, New York
Langan Project No. 170747001
BCP SIte No. C224398

VOCs (mg/kg)	
1,1,1-Trichloroethane	0.68
1,1-Dichloroethane	0.27
1,1-Dichloroethylene	0.33
1,2,4-Trimethylbenzene	3.6
1,2-Dichlorobenzene	1.1
1,2-Dichloroethane	0.02
1,3,5-Trimethylbenzene	8.4
1,3-Dichlorobenzene	2.4
1,4-Dichlorobenzene	1.8
1,4-Dioxane	0.1
Acetone	0.05
Benzene	0.06
Carbon tetrachloride	0.76
Chlorobenzene	1.1
Chloroform	0.37
Cis-1,2-Dichloroethene	0.25
Ethyl Benzene	1
Hexachlorobenzene	0.33
Methyl Ethyl Ketone (2-Butanone)	0.12
Methyl tert-butyl ether (MTBE)	0.93
Methylene chloride	0.05
n-Butylbenzene	12
n-Propylbenzene	3.9
sec-Butylbenzene	11
tert-Butylbenzene	5.9
Tetrachloroethene	1.3
Toluene	0.7
trans-1,2-Dichloroethene	0.19
Trichloroethene	0.47
Vinyl Chloride	0.02
Xylenes, Total	0.26

Metals (mg/kg)	
Arsenic	13
Barium	350
Beryllium	7.2
Cadmium	2.5
Chromium, hexavalent	1
Copper	50
Cyanide	27
Lead	63
Manganese	1,600
Mercury	0.18
Nickel	30
Selenium	3.9
Silver	2
Zinc	109

SVOCs (mg/kg)	
Acenaphthene	20
Acenaphthylene	100
Anthracene	100
Benzo(a)anthracene	1
Benzo(a)pyrene	1
Benzo(b)fluoranthene	1
Benzo(g,h,i)perylene	100
Benzo(k)fluoranthene	0.8
Chrysene	1
Dibenzo(a,h)anthracene	0.33
Fluoranthene	100
Fluorene	30
Indeno(1,2,3-cd)pyrene	0.5
m-Cresol	0.33
Naphthalene	12
o-Cresol	0.33
p-Cresol	0.33
Pentachlorophenol	0.8
Phenanthrene	100
Phenol	0.33
Pyrene	100

PCBs/Pesticides (mg/kg)	
2,4,5-TP Acid (Silvex)	3.8
4,4'-DDE	0.0033
4,4'-DDT	0.0033
4,4'-DDD	0.0033
Aldrin	0.005
alpha-BHC	0.02
beta-BHC	0.036
Chlordane (alpha)	0.094
delta-BHC	0.04
Dibenzofuran	7
Dieldrin	0.005
Endosulfan I	2.4
Endosulfan II	2.4
Endosulfan sulfate	2.4
Endrin	0.014
Heptachlor	0.042
Lindane	0.1
Polychlorinated biphenyls	0.1

Notes:
1. The above criteria are the Title 6 of the New York Codes, Rules and Regulations (6 NYCRR) Part 375 Unrestricted Use Soil Cleanup Objectives (i.e., the Track 1 soil cleanup objectives).
2. VOC: volatile organic compound
3. SVOC: semivolatile organic compound
4. PCBs: polychlorinated biphenyls
5. mg/kg: milligram per kilogram

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP01	EP02	EP02	EP03	EP04	EP05	EP06	EP07	EP08	EP09	EP10	EP11	EP12	EP13	EP14	EP15	EP16	EP17	EP18
			Sample Name	EP01_EL4.5	EP02_EL4.5	EP02_EL3.5	EP03_EL4.5	EP04_EL4.5	EP05_EL4.5	EP06_EL4.5	EP07_EL3	EP08_EL3	EP09_EL1.5	EP10_EL1.5	EP11_EL1.5	EP12_EL1.5	EP13_EL1.5	EP14_EL1	EP15_EL1	EP16_EL1	EP17_EL1.5	EP18_EL1.5
			Sample Date	09/15/2025	09/15/2025	09/23/2025	09/15/2025	09/15/2025	09/15/2025	09/11/2025	09/05/2025	09/05/2025	09/18/2025	09/18/2025	09/22/2025	09/16/2025	09/16/2025	09/10/2025	09/05/2025	09/05/2025	09/18/2025	09/18/2025
			Sample Elevation	4.5	4.5	3.5	4.5	4.5	4.5	4.5	3	3	1.5	1.5	1.5	1.5	1.5	1	1	1	1.5	1.5
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																						
1,1,1,2-Tetrachloroethane	630-20-6	NS	mg/kg	<0.021 U	<0.021 U	NA	<0.021 U	<0.022 U	<0.022 U	NA	<0.0053 U	<0.0056 U	<0.0054 U	<0.0054 U	<0.021 U	<0.02 U	<0.022 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,1,1-Trichloroethane	71-55-6	0.68	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.68 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,1,2-Trichloroethane	79-00-5	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,1-Dichloroethane	75-34-3	0.27	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.27 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,1-Dichloroethene	75-35-4	0.33	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.33 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,1-Dichloropropene	563-58-6	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0054 U	<0.56 U	NA	NA	NA	<0.93 U	NA	NA	<0.0055 U	<0.0048 U
1,2,3-Trichlorobenzene	87-61-6	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,2,3-Trichloropropane	96-18-4	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	NA	<0.0053 U	<0.0056 U	<0.0054 U	<0.0054 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,2,4,5-Tetramethylbenzene	95-93-2	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	120-82-1	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,2,4-Trimethylbenzene	95-63-6	3.6	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,2-Dichlorobenzene	95-50-1	1.1	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,2-Dichloroethane	107-06-2	0.02	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.0072 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,2-Dichloropropane	78-87-5	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 UJ	<0.0056 UJ	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 UJ	<0.0058 UJ	<0.0055 U	<0.0048 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.0054 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,3-Dichlorobenzene	541-73-1	2.4	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,3-Dichloropropane	142-28-9	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0054 U	<0.0054 U	NA	NA	NA	<0.93 U	NA	NA	<0.0055 U	<0.0048 U
1,4-Dichlorobenzene	106-46-7	1.8	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
1,4-Diethyl Benzene	105-05-5	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	mg/kg	NA	NA	NA	NA	NA	NA	<0.11 U	NA	NA	<0.081 U	<8.3 U	NA	NA	NA	NA	NA	NA	<0.083 U	<0.072 U
2,2-Dichloropropane	594-20-7	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0054 U	<0.56 U	NA	NA	NA	<0.93 U	NA	NA	<0.0055 U	<0.0048 U
2-Chlorotoluene	95-49-8	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0054 U	<0.0054 U	NA	NA	NA	<0.93 U	NA	NA	<0.0055 U	<0.0048 U
2-Hexanone (MBK)	591-78-6	NS	mg/kg	<0.026 U	<0.027 U	NA	<0.027 U	<0.028 U	<0.028 U	<0.038 U	<0.0053 U	<0.0056 U	<0.027 U	<2.8 U	<0.027 U	<0.025 U	<0.027 U	<4.7 U	<0.0053 U	<0.0058 U	<0.028 U	<0.024 U
4-Chlorotoluene	106-43-4	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0054 U	<0.56 U	NA	NA	NA	<0.93 U	NA	NA	<0.0055 U	<0.0048 U
4-Ethyltoluene	622-96-8	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	67-64-1	**0.05**	mg/kg	<0.05 U	<0.05 U	NA	<0.05 U	<0.05 U	<0.05 U	<0.038 U	<0.011 U	<0.011 U	<0.027 U	<2.8 U	<0.053 U	<0.05 U	<0.05 U	<0.036 U	<0.011 U	<0.012 U	<0.028 U	<0.024 U
Acrolein	107-02-8	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	NA	<0.011 U	<0.011 U	<0.027 U	<0.027 U	<0.0053 U	<0.0051 U	<0.0054 U	NA	<0.011 U	<0.012 U	<0.028 U	<0.024 U
Acrylonitrile	107-13-1	NS	mg/kg	<0.021 U	<0.021 U	NA	<0.021 U	<0.022 U	<0.022 U	NA	<0.0053 U	<0.0056 U	<0.011 U	<0.011 U	<0.021 U	<0.02 U	<0.022 U	<1.9 U	<0.0053 U	<0.0058 U	<0.011 U	<0.0097 U
Benzene	71-43-2	0.06	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.0072 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Bromobenzene	108-86-1	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0054 U	<0.56 U	NA	NA	NA	<0.93 U	NA	NA	<0.0055 U	<0.0048 U
Bromochloromethane	74-97-5	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Bromodichloromethane	75-27-4	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Bromoform	75-25-2	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Bromomethane	74-83-9	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Carbon Disulfide	75-15-0	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Carbon Tetrachloride	56-23-5	0.76	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.76 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Chlorobenzene	108-90-7	1.1	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Chloroethane	75-00-3	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 UJ	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 UJ	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Chloroform	67-66-3	0.37	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.37 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Chloromethane	74-87-3	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Cis-1,2-Dichloroethene	156-59-2	0.25	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.25 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Cis-1,3-Dichloropropene	10061-01-5	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Cyclohexane	110-82-7	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	NA	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Cymene	99-87-6	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	NA	<0.0053 U	<0.0056 U	<0.0054 U	<0.0054 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Dibromochloromethane	124-48-1	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Dibromomethane	74-95-3	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	NA	<0.0053 U	<0.0056 U	<0.0054 U	<0.0054 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Dichlorodifluoromethane	75-71-8	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Diethyl Ether (Ethyl Ether)	60-29-7	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	100-41-4	1	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Hexachlorobutadiene	87-68-3	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	NA	<0.0053 U	<0.0056 U	<0.0054 U	<0.0054 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Isopropylbenzene (Cumene)	98-82-8	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
M,P-Xylene	179601-23-1	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.011 U	<0.011 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.011 U	<0.012 U	<0.0055 U	<0.0048 U
Methyl Acetate	79-20-9	NS	mg/kg	<0.053 U	<0.054 U	NA	<0.054 U	<0.056 U	<0.055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.054 U	<5.6 U	<0.053 U	<0.051 U	<0.054 U	NA	<0.0053 U	<0.0058 U	<0.055 U	<0.048 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	mg/kg	<0.032 U	<0.032 U	NA	<0.032 U	<0.033 U	<0.033 U	<0.046 U	0.0029 J	<0.0056 U	<0.027 U	<2.8 U	<0.032 U	<0.03 U	<0.032 U	<0.043 U	0.0027 J	<0.0058 U	<0.028 U	<0.024 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	mg/kg	<0.026 U	<0.027 U	NA	<0.027 U	<0.028 U	<0.028 U	<0.038 U	<0.0053 UJ	<0.0056 UJ	<0.027 U	<2.8 U	<0.027 U	<0.025 U	<0.027 U	<4.7 U	<0.0053 UJ	<0.0058 UJ	<0.028 U	<0.024 U
Methylcyclohexane	108-87-2	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	NA	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Methylene Chloride	75-09-2	0.05	mg/kg	<0.026 U	<0.027 U	NA	<0.027 U	<0.028 U	<0.028 U	<0.0077 U	<0.011 U	<0.011 U	<0.011 U	<1.1 U	<0.027 U	<0.025 U	<0.027 U	<0.0072 U	<0.011 U	<0.012 U	<0.011 U	<0.0048 U
Naphthalene	91-20-3	12	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0054 U	<0.0054 U	NA	NA	NA	<0.93 U	NA	NA	<0.0055 U	<0.0048 U
n-Butylbenzene	104-51-8	12	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	NA	<0.0053 U	<0.0056 U	<0.0054 U	<0.0054 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
n-Propylbenzene	103-65-1	3.9	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	NA	<0.0053 U	<0.0056 U	<0.0054 U	<0.0054 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
o-Cymene (O-Isopropyltoluene)	527-84-4	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0054 U	<0.56 U	NA	NA	NA	<0.93 U	NA	NA	<0.0055 U	<0.0048 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Sec-Butylbenzene	135-98-8	11	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	NA	<0.0053 U	<0.0056 U	<0.0054 U	<0.0054 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Styrene	100-42-5	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
T-Butylbenzene	98-06-6	5.9	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	NA	<0.0053 UJ	<0.0056 UJ	<0.0054 U	<0.0054 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 UJ	<0.0058 UJ	<0.0055 U	<0.0048 U
Tert-Butyl Alcohol	75-65-0	NS	mg/kg	<0.11 U	<0.11 U	NA	<0.11 U	<0.11 U	<0.11 U	NA	<0.027 U	<0.028 U	<0.11 U	<0.11 U	<0.11 U	<0.1 U	<0.11 U	NA	<0.026 U	<0.029 U	<0.11 U	<0.097 U
Tert-Butyl Methyl Ether (MTBE)	1634-04-4	0.93	mg/kg	<0.011 U	<0.011 U	NA	<0.011 U	<0.011 U	<0.011 U	<0.015 U	<0.0053 U	<0.0056 U	<0.011 U	<1.1 U	<0.011 U	<0.01 U	<0.011 U	<0.93 U	<0.0053 U	<0.0058 U	<0.011 U	<0.0097 U
Tetrachloroethene (PCE)	127-18-4	1.3	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Tetrahydrofuran	109-99-9	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.011 U	<1.1 U	NA	NA	NA	<1.9 U	NA	NA	<0.011 U	<0.0097 U
Toluene	108-88-3	0.7	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 UJ	<0.0056 UJ	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.7 U	<0.0053 UJ	<0.0058 UJ	<0.0055 U	<0.0048 U
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Xylenes	1330-20-7	0.26	mg/kg	NA	NA	NA	NA	NA	NA	NA	<0.016 U	<0.017 U	NA	NA	NA	NA	NA	NA	<0.016 U	<0.017 U	NA	NA
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trans-1,2-Dichloroethene	156-60-5	0.19	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.19 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Trans-1,3-Dichloropropene	10061-02-6	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	mg/kg	<0.011 U	<0.011 U	NA	<0.011 U	<0.011 U	<0.011 U	NA	NA	NA	<0.011 U	<1.1 U	<0.011 U	<0.01 U	<0.011 U	<1.9 U	NA	NA	<0.011 U	<0.0097 U
Trichloroethene (TCE)	79-01-6	0.47	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.47 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Trichlorofluoromethane	75-69-4	NS	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 UJ	<0.0053 U	<0.0051 U	<0.0054 U	<0.93 UJ	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U
Vinyl Acetate	108-05-4	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Chloride	75-01-4	0.02	mg/kg	<0.0053 U	<0.0054 U	NA	<0.0054 U	<0.0056 U	<0.0055 U	<0.0077 U	<0.0053 U	<0.0056 U	<0.0054 U	<0.56 U	<0.0053 U	<0.0051 U	<0.0054 U	<0.0072 U	<0.0053 U	<0.0058 U	<0.0055 U	<0.0048 U

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP01	EP02	EP02	EP03	EP04	EP05	EP06	EP07	EP08	EP09	EP10	EP11	EP12	EP13	EP14	EP15	EP16	EP17	EP18
			Sample Name	EP01_EL4.5	EP02_EL4.5	EP02_EL3.5	EP03_EL4.5	EP04_EL4.5	EP05_EL4.5	EP06_EL4.5	EP07_EL3	EP08_EL3	EP09_EL1.5	EP10_EL1.5	EP11_EL1.5	EP12_EL1.5	EP13_EL1.5	EP14_EL1	EP15_EL1	EP16_EL1	EP17_EL1.5	EP18_EL1.5
			Sample Date	09/15/2025	09/15/2025	09/23/2025	09/15/2025	09/15/2025	09/15/2025	09/11/2025	09/05/2025	09/05/2025	09/18/2025	09/18/2025	09/22/2025	09/16/2025	09/16/2025	09/10/2025	09/05/2025	09/05/2025	09/18/2025	09/18/2025
			Sample Elevation	4.5	4.5	3.5	4.5	4.5	4.5	4.5	3	3	1.5	1.5	1.5	1.5	1.5	1	1	1	1.5	1.5
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																						
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	mg/kg	<0.172 U	<0.176 U	NA	<0.172 U	<0.172 U	<0.172 U	<0.168 U	<0.17 U	<0.17 U	<0.178 U	<0.184 U	<0.177 U	<0.189 U	<0.0922 U	<0.218 UJ	<0.194 U	<0.209 U	<0.186 U	<0.185 U
1,2,4-Trichlorobenzene	120-82-1	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	95-50-1	1.1	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Diphenylhydrazine	122-66-7	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
1,3-Dichlorobenzene	541-73-1	2.4	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	106-46-7	1.8	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	mg/kg	<0.0192 U	<0.0198 U	NA	<0.0196 U	<0.0198 U	<0.0198 U	<0.0198 U	<0.019 U	<0.019 U	<0.0192 U	<0.0192 U	<0.0196 U	<0.0198 U	<0.0196 U	<0.0334 U	<0.0187 U	<0.0187 U	<0.0194 U	<0.0198 U
2,3,4,6-Tetrachlorophenol	58-90-2	NS	mg/kg	<0.172 U	<0.176 U	NA	<0.172 U	<0.172 U	<0.172 U	<0.168 U	<0.17 U	<0.17 U	<0.178 U	<0.184 U	<0.177 U	<0.189 U	<0.0922 U	<0.218 UJ	<0.194 U	<0.209 U	<0.186 U	<0.185 U
2,4,5-Trichlorophenol	95-95-4	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
2,4,6-Trichlorophenol	88-06-2	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
2,4-Dichlorophenol	120-83-2	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
2,4-Dimethylphenol	105-67-9	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
2,4-Dinitrophenol	51-28-5	NS	mg/kg	<0.172 U	<0.176 U	NA	<0.172 U	<0.172 U	<0.172 U	<0.168 U	<0.17 U	<0.17 U	<0.178 U	<0.184 U	<0.177 U	<0.189 U	<0.0922 U	<0.218 UJ	<0.194 U	<0.209 U	<0.186 U	<0.185 U
2,4-Dinitrotoluene	121-14-2	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
2,6-Dinitrotoluene	606-20-2	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
2-Chloronaphthalene	91-58-7	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
2-Chlorophenol	95-57-8	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
2-Methylnaphthalene	91-57-6	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
2-Methylphenol (o-Cresol)	95-48-7	0.33	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
2-Nitroaniline	88-74-4	NS	mg/kg	<0.172 U	<0.176 U	NA	<0.172 U	<0.172 U	<0.172 U	<0.168 U	<0.17 U	<0.17 U	<0.178 U	<0.184 U	<0.177 U	<0.189 U	<0.0922 U	<0.218 UJ	<0.194 U	<0.209 U	<0.186 U	<0.185 U
2-Nitrophenol	88-75-5	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
3,3'-Dichlorobenzidine	91-94-1	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
3-Nitroaniline	99-09-2	NS	mg/kg	<0.172 U	<0.176 U	NA	<0.172 U	<0.172 U	<0.172 U	<0.168 U	<0.17 U	<0.17 U	<0.178 U	<0.184 U	<0.177 U	<0.189 U	<0.0922 U	<0.218 UJ	<0.194 U	<0.209 U	<0.186 U	<0.185 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	mg/kg	<0.172 U	<0.176 U	NA	<0.172 U	<0.172 U	<0.172 U	<0.168 U	<0.17 U	<0.17 U	<0.178 U	<0.184 U	<0.177 U	<0.189 U	<0.0922 U	<0.218 UJ	<0.194 U	<0.209 U	<0.186 U	<0.185 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
4-Chloro-3-Methylphenol	59-50-7	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
4-Chloroaniline	106-47-8	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
4-Nitroaniline	100-01-6	NS	mg/kg	<0.172 U	<0.176 U	NA	<0.172 U	<0.172 U	<0.172 U	<0.168 U	<0.17 U	<0.17 U	<0.178 U	<0.184 U	<0.177 U	<0.189 U	<0.0922 U	<0.218 UJ	<0.194 U	<0.209 U	<0.186 U	<0.185 U
4-Nitrophenol	100-02-7	NS	mg/kg	<0.172 U	<0.176 U	NA	<0.172 U	<0.172 U	<0.172 U	<0.168 U	<0.17 U	<0.17 U	<0.178 U	<0.184 U	<0.177 U	<0.189 U	<0.0922 U	<0.218 UJ	<0.194 U	<0.209 U	<0.186 U	<0.185 U
Acenaphthene	83-32-9	20	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Acenaphthylene	208-96-8	100	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Acetophenone	98-86-2	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Aniline (Phenylamine, Aminobenzene)	62-53-3	NS	mg/kg	<0.346 U	<0.353 U	NA	<0.345 U	<0.345 U	<0.346 U	<0.337 U	<0.34 U	<0.341 U	<0.356 U	<0.369 U	<0.354 U	<0.38 U	<0.185 U	<0.438 UJ	<0.39 U	<0.419 U	<0.373 U	<0.371 U
Anthracene	120-12-7	100	mg/kg	<0.0863 U	0.0613 JD	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Atrazine	1912-24-9	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Benzaldehyde	100-52-7	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Benzidine	92-87-5	NS	mg/kg	<0.346 U	<0.353 U	NA	<0.345 U	<0.345 U	<0.346 U	<0.337 U	<0.34 U	<0.341 U	<0.356 U	<0.369 U	<0.354 U	<0.38 U	<0.185 U	<0.438 UJ	<0.39 U	<0.419 U	<0.373 U	<0.371 U
Benzo(a)anthracene	56-55-3	**1**	mg/kg	0.0676 JD	0.189 D	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	0.054 JD
Benzo(a)pyrene	50-32-8	**1**	mg/kg	0.0545 JD	0.137 D	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	0.0585 JD
Benzo(b)fluoranthene	205-99-2	**1**	mg/kg	0.0503 JD	0.165 D	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Benzo(g,h,i)Perylene	191-24-2	100	mg/kg	<0.0863 U	0.11 D	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Benzo(k)fluoranthene	207-08-9	**0.8**	mg/kg	<0.0863 U	0.147 D	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Benzoic Acid	65-85-0	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 UJ	<0.0852 UJ	<0.0889 UJ	<0.0922 UJ	<0.0884 UJ	<0.0948 UJ	<0.0461 UJ	<0.109 UJ	<0.0974 UJ	<0.105 UJ	<0.0931 UJ	<0.0926 UJ
Benzyl Alcohol	100-51-6	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Benzyl Butyl Phthalate	85-68-7	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Biphenyl (Diphenyl)	92-52-4	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Bis(2-chloroethoxy) methane	111-91-1	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Bis(2-chloroisopropyl) ether	108-60-1	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Bis(2-ethylhexyl) phthalate	117-81-7	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	0.0717 J	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Caprolactam	105-60-2	NS	mg/kg	<0.172 U	<0.176 U	NA	<0.172 U	<0.172 U	<0.172 U	<0.168 U	<0.17 U	<0.17 U	<0.178 U	<0.184 U	<0.177 U	<0.189 U	<0.0922 U	<0.218 UJ	<0.194 U	<0.209 U	<0.186 U	<0.185 U
Carbazole	86-74-8	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Chrysene	218-01-9	**1**	mg/kg	0.0572 JD	0.173 D	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	0.0526 JD
Dibenz(a,h)anthracene	53-70-3	**0.33**	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Dibenzofuran	132-64-9	7	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Dibutyl phthalate	84-74-2	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Diethyl phthalate	84-66-2	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Dimethyl phthalate	131-11-3	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Dioctyl phthalate	117-84-0	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Diphenylamine	122-39-4	NS	mg/kg	<0.172 U	<0.176 U	NA	<0.172 U	<0.172 U	<0.172 U	<0.168 U	<0.17 U	<0.17 U	<0.178 U	<0.184 U	<0.177 U	<0.189 U	<0.0922 U	<0.218 UJ	<0.194 U	<0.209 U	<0.186 U	<0.185 U
Fluoranthene	206-44-0	100	mg/kg	0.121 D	0.385 D	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	0.0874 J	<0.0974 U	<0.105 U	<0.0931 U	0.0881 JD
Fluorene	86-73-7	30	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Hexachlorobenzene	118-74-1	0.33	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Hexachlorobutadiene	87-68-3	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Hexachlorocyclopentadiene	77-47-4	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Hexachloroethane	67-72-1	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	mg/kg	<0.0863 U	0.13 D	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Isophorone	78-59-1	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Naphthalene	91-20-3	12	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Nitrobenzene	98-95-3	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
n-Nitrosodimethylamine	62-75-9	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
n-Nitrosodiphenylamine	86-30-6	NS	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Pentachlorophenol	87-86-5	0.8	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Phenanthrene	85-01-8	100	mg/kg	0.0703 JD	0.289 D	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 U	<0.105 U	<0.0931 U	<0.0926 U
Phenol	108-95-2	0.33	mg/kg	<0.0863 U	<0.0881 U	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 UJ	<0.0852 UJ	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	<0.109 UJ	<0.0974 UJ	<0.105 UJ	<0.0931 U	<0.0926 U
Pyrene	129-00-0	100	mg/kg	0.114 D	0.443 D	NA	<0.0862 U	<0.0862 U	<0.0863 U	<0.0842 U	<0.0849 U	<0.0852 U	<0.0889 U	<0.0922 U	<0.0884 U	<0.0948 U	<0.0461 U	0.0874 J	<0.0974 U	<0.105 U	<0.0931 U	0.077 JD
Pyridine	110-86-1	NS	mg/kg	<0.346 U	<0.353 U	NA	<0.345 U	<0.345 U	<0.346 U	<0.337 U	<0.34 U	<0.341 U	<0.356 U	<0.369 U	<0.354 U	<0.38 U	<0.185 U	<0.438 UJ	<0.39 U	<0.419 U	<0.373 U	<0.371 U

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP01	EP02	EP02	EP03	EP04	EP05	EP06	EP07	EP08	EP09	EP10	EP11	EP12	EP13	EP14	EP15	EP16	EP17	EP18
			Sample Name	EP01_EL4.5	EP02_EL4.5	EP02_EL3.5	EP03_EL4.5	EP04_EL4.5	EP05_EL4.5	EP06_EL4.5	EP07_EL3	EP08_EL3	EP09_EL1.5	EP10_EL1.5	EP11_EL1.5	EP12_EL1.5	EP13_EL1.5	EP14_EL1	EP15_EL1	EP16_EL1	EP17_EL1.5	EP18_EL1.5
			Sample Date	09/15/2025	09/15/2025	09/23/2025	09/15/2025	09/15/2025	09/15/2025	09/11/2025	09/05/2025	09/05/2025	09/18/2025	09/18/2025	09/22/2025	09/16/2025	09/16/2025	09/10/2025	09/05/2025	09/05/2025	09/18/2025	09/18/2025
			Sample Elevation	4.5	4.5	3.5	4.5	4.5	4.5	4.5	3	3	1.5	1.5	1.5	1.5	1.5	1	1	1	1.5	1.5
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																						
4,4'-DDD	72-54-8	**0.0033**	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
4,4'-DDE	72-55-9	**0.0033**	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
4,4'-DDT	50-29-3	**0.0033**	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Aldrin	309-00-2	0.005	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Alpha Chlordane	5103-71-9	0.094	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Alpha Endosulfan	959-98-8	2.4	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Beta Endosulfan	33213-65-9	2.4	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Chlordane (alpha and gamma)	57-74-9	NS	mg/kg	<0.0341 U	<0.0346 U	NA	<0.034 U	<0.034 U	<0.0342 U	<0.0332 U	<0.0343 U	<0.0336 U	<0.00708 U	<0.00727 U	<0.00707 U	<0.00767 U	<0.00733 U	<0.0173 U	<0.0394 U	<0.0418 U	<0.00734 U	<0.00728 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Dieldrin	60-57-1	**0.005**	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	0.00045	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Endosulfan Sulfate	1031-07-8	2.4	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Endrin	72-20-8	0.014	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Endrin Aldehyde	7421-93-4	NS	mg/kg	<0.00171 U	0.00289 D	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Endrin Ketone	53494-70-5	NS	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Gamma Bhc (Lindane)	58-89-9	0.1	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Gamma Chlordane (Trans)	5103-74-2	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gamma-Chlordane	5566-34-7	NS	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	0.000373	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Heptachlor	76-44-8	0.042	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Heptachlor Epoxide	1024-57-3	NS	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Methoxychlor	72-43-5	NS	mg/kg	<0.00171 U	<0.00173 U	NA	<0.0017 U	<0.0017 U	<0.00171 U	<0.00166 U	<0.00171 U	<0.00168 U	<0.000354 U	<0.000364 U	<0.000353 U	<0.000384 U	<0.000366 U	<0.000867 U	<0.00197 U	<0.00209 U	<0.000367 U	<0.000364 U
Toxaphene	8001-35-2	NS	mg/kg	<0.171 U	<0.173 U	NA	<0.17 U	<0.17 U	<0.171 U	<0.166 U	<0.171 U	<0.168 U	<0.0354 U	<0.0364 U	<0.0353 U	<0.0384 U	<0.0366 U	<0.0867 U	<0.197 U	<0.209 U	<0.0367 U	<0.0364 U
Herbicides																						
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	mg/kg	<0.0207 U	<0.0211 U	NA	<0.0207 U	<0.0207 U	<0.0207 U	<0.0205 U	<0.0204 U	<0.0204 U	<0.0211 U	<0.0219 U	<0.0212 U	<0.023 U	<0.022 U	<0.026 U	<0.0234 U	<0.0251 U	<0.0221 U	<0.0218 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	mg/kg	<0.0207 U	<0.0211 U	NA	<0.0207 U	<0.0207 U	<0.0207 U	<0.0205 U	<0.0204 U	<0.0204 U	<0.0211 U	<0.0219 U	<0.0212 U	<0.023 U	<0.022 U	<0.026 U	<0.0234 U	<0.0251 U	<0.0221 U	<0.0218 U
Silvex (2,4,5-Tp)	93-72-1	3.8	mg/kg	<0.0207 U	<0.0211 U	NA	<0.0207 U	<0.0207 U	<0.0207 U	<0.0205 U	<0.0204 U	<0.0204 U	<0.0211 U	<0.0219 U	<0.0212 U	<0.023 U	<0.022 U	<0.026 U	<0.0234 U	<0.0251 U	<0.0221 U	<0.0218 U
Polychlorinated Biphenyl																						
PCB-1016 (Aroclor 1016)	12674-11-2	NS	mg/kg	<0.0172 U	<0.0175 U	NA	<0.0172 U	<0.0172 U	<0.0172 U	<0.0168 U	<0.0173 U	<0.017 U	<0.0179 U	<0.0184 U	<0.0176 U	<0.0194 UJ	<0.0185 U	<0.0438 U	<0.0199 U	<0.0211 U	<0.0185 U	<0.0184 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	mg/kg	<0.0172 U	<0.0175 U	NA	<0.0172 U	<0.0172 U	<0.0172 U	<0.0168 U	<0.0173 U	<0.017 U	<0.0179 U	<0.0184 U	<0.0176 U	<0.0194 UJ	<0.0185 U	<0.0438 U	<0.0199 U	<0.0211 U	<0.0185 U	<0.0184 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	mg/kg	<0.0172 U	<0.0175 U	NA	<0.0172 U	<0.0172 U	<0.0172 U	<0.0168 U	<0.0173 U	<0.017 U	<0.0179 U	<0.0184 U	<0.0176 U	<0.0194 UJ	<0.0185 U	<0.0438 U	<0.0199 U	<0.0211 U	<0.0185 U	<0.0184 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	mg/kg	<0.0172 U	<0.0175 U	NA	<0.0172 U	<0.0172 U	<0.0172 U	<0.0168 U	<0.0173 U	<0.017 U	<0.0179 U	<0.0184 U	<0.0176 U	<0.0194 UJ	<0.0185 U	<0.0438 U	<0.0199 U	<0.0211 U	<0.0185 U	<0.0184 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	mg/kg	<0.0172 U	<0.0175 U	NA	<0.0172 U	<0.0172 U	<0.0172 U	<0.0168 U	<0.0173 U	<0.017 U	<0.0179 U	<0.0184 U	<0.0176 U	<0.0194 UJ	<0.0185 U	<0.0438 U	<0.0199 U	<0.0211 U	<0.0185 U	<0.0184 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	mg/kg	<0.0172 U	<0.0175 U	NA	<0.0172 U	<0.0172 U	<0.0172 U	<0.0168 U	<0.0173 U	<0.017 U	<0.0179 U	<0.0184 U	<0.0176 U	<0.0194 UJ	<0.0185 U	<0.0438 U	<0.0199 U	<0.0211 U	<0.0185 U	<0.0184 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	mg/kg	<0.0172 U	<0.0175 U	NA	<0.0172 U	<0.0172 U	<0.0172 U	<0.0168 U	<0.0173 U	<0.017 U	<0.0179 U	<0.0184 U	<0.0176 U	<0.0194 UJ	<0.0185 U	<0.0438 U	<0.0199 U	<0.0211 U	<0.0185 U	<0.0184 U
PCB-1262 (Aroclor 1262)	37324-23-5	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1268 (Aroclor 1268)	11100-14-4	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PCBs	1336-36-3	0.1	mg/kg	<0.0172 U	<0.0175 U	NA	<0.0172 U	<0.0172 U	<0.0172 U	<0.0168 U	<0.0173 U	<0.017 U	<0.0179 U	<0.0184 U	<0.0176 U	<0.0194 UJ	<0.0185 U	<0.0438 U	<0.0199 U	<0.0211 U	<0.0185 U	<0.0184 U
Metals																						
Aluminum	7429-90-5	NS	mg/kg	1,170	1,570	NA	912	855	790	941	726	597	628	625	786	842	795	1,270	785	688	535	649
Antimony	7440-36-0	NS	mg/kg	<2.16 U	<2.21 U	NA	<2.16 U	<2.16 U	<2.16 U	<2.15 U	<2.18 U	<2.17 U	<2.24 U	<2.33 U	<2.23 U	<2.43 U	<2.33 U	<2.74 UJ	<2.5 U	<2.68 U	<2.35 U	<2.32 U
Arsenic	7440-38-2	13	mg/kg	4.57	2.55	NA	<1.3 U	<1.3 U	<1.3 U	<1.29 U	<1.31 U	<1.3 U	<1.35 U	<1.4 U	<1.34 U	<1.46 U	<1.4 U	<1.64 U	<1.5 U	<1.61 U	<1.41 U	<1.39 U
Barium	7440-39-3	**350**	mg/kg	16.8	133	NA	8.8	6.58	7.32	7.97	9.3	4.6	3.73	3.3	8.33	7.62	6.06	9.17	4.7	4.12	3.88	8.74
Beryllium	7440-41-7	7.2	mg/kg	<0.044 U	<0.045 U	NA	<0.044 U	<0.044 U	<0.044 U	<0.043 U	<0.044 U	<0.044 U	<0.045 U	<0.047 U	<0.045 U	<0.049 U	<0.047 U	<0.055 U	<0.05 U	<0.054 U	<0.047 U	<0.047 U
Cadmium	7440-43-9	2.5	mg/kg	<0.259 U	0.353	NA	<0.259 U	<0.259 U	<0.26 U	<0.258 U	<0.261 U	<0.26 U	<0.269 U	<0.279 U	<0.268 U	<0.292 U	<0.279 U	<0.329 U	<0.3 U	<0.322 U	<0.282 U	<0.279 U
Calcium	7440-70-2	NS	mg/kg	929	1,040	NA	498	508	367	516	446	277	458	406	437	540	390	1,050	713	435	292	623
Chromium, Hexavalent	18540-29-9	**1**	mg/kg	<0.519 U	<0.53 U	NA	<0.518 U	<0.518 U	<0.519 U	<0.515 U	<0.523 U	<0.521 U	<0.538 U	<0.558 U	<0.535 U	<0.583 U	<0.559 U	<0.658 U	<0.599 U	<0.643 U	<0.564 U	<0.557 U
Chromium, Total	7440-47-3	NS	mg/kg	8.37	7.45	NA	4.45	4.4	3.62	4.37	3.42	2.67	3.46	3.79	3.73	4.44	3.67	4.78	4.1	3.37	2.39	3.31
Chromium, Trivalent	16065-83-1	30	mg/kg	8.37	7.45	NA	4.45	4.4	3.62	4.37	3.42	2.67	3.46	3.79	3.73	4.44	3.67	4.78	4.1	3.37	2.39	3.31
Cobalt	7440-48-4	NS	mg/kg	1.22	2.32	NA	0.899	0.916	0.684	0.841	0.619	0.425	<0.359 U	<0.372 U	0.58	0.515	0.484	0.712	0.509	<0.428 U	<0.375 U	<0.371 U
Copper	7440-50-8	50	mg/kg	6.08	43.7	NA	1.95	2.25	3.47	2.6	<1.74 U	1.99	5.5	<1.86 U	<1.78 U	<1.94 U	<1.86 U	3.21	<2 U	<2.14 U	<1.88 U	2.53
Cyanide	57-12-5	27	mg/kg	<0.519 U	<0.53 U	NA	<0.518 U	<0.518 U	<0.519 U	<0.515 U	<0.523 U	<0.521 U	<0.538 U	<0.558 U	<0.535 U	<0.583 U	<0.559 U	<0.658 U	<0.599 U	<0.643 U	<0.564 U	<0.557 U
Iron	7439-89-6	NS	mg/kg	2,780	6,630	NA	1,340	1,350	1,030	1,330	1,200	879	942	999	1,140	1,360 J	1,040	1,780	1,380	1,040	966	1,200
Lead	7439-92-1	**63**	mg/kg	12	**159**	3.18	4.99	6.04	3.26	6.25	8.16	3.35	2.21	1.98	2.06	2.92	2.23	13.4	3.32	1.63	0.93	9.14
Magnesium	7439-95-4	NS	mg/kg	326	510	NA	290	297	236	288	249	223	221	210	289	303	261	557	293	243	203	211
Manganese	7439-96-5	1600	mg/kg	91	150	NA	38.1	33.9	30.4	36.2	30.4	24.2	28	28	25.9	28.8	29.2	26.3	29.1	22.3	17	33.7
Mercury	7439-97-6	**0.18**	mg/kg	<0.0311 U	0.0855	NA	<0.0311 U	<0.0311 U	<0.0312 U	<0.0309 U	<0.0314 U	<0.0313 U	<0.0323 U	<0.0335 U	<0.0321 U	<0.035 U	<0.0335 U	<0.0395 U	<0.036 U	<0.0386 U	<0.0338 U	<0.0334 U
Nickel	7440-02-0	30	mg/kg	1.91	7.06	NA	1.47	1.29	1.12	1.35	1.13	0.99	<0.894 U	<0.927 U	1.19	1.09	0.931	2.39	1.16	<1.07 U	<0.936 U	<0.925 U
Potassium	7440-09-7	NS	mg/kg	177	221	NA	184	193	177	219	153	114	116	123	172	171	167	298 J	180	164	121	124
Selenium	7782-49-2	3.9	mg/kg	<2.16 U	<2.21 U	NA	<2.16 U	<2.16 U	<2.16 U	<2.15 U	<2.18 U	<2.17 U	<2.24 U	<2.33 U	<2.23 U	<2.43 U	<2.33 U	<2.74 U	<2.5 U	<2.68 U	<2.35 U	<2.32 U
Silver	7440-22-4	2	mg/kg	<0.436 U	<0.445 U	NA	<0.435 U	<0.435 U	<0.436 U	<0.433 U	<0.439 U	<0.438 U	<0.452 U	<0.469 U	<0.45 U	<0.49 U	<0.469 U	<0.552 U	<0.503 U	<0.54 U	<0.473 U	<0.468 U
Sodium	7440-23-5	NS	mg/kg	61.2	99.9	NA	52.8	62.7	55.5	74.4	<43.6 U	<43.4 U	<44.9 U	<46.5 U	<44.6 U	<48.6 U	<46.6 U	82.7 J	<49.9 U	<53.6 U	<47 U	51.7
Thallium	7440-28-0	NS	mg/kg	<1.73 U	<1.77 U	NA	<1.73 U	<1.73 U	<1.73 U	<1.72 U	<1.75 U	<1.74 U	<1.8 U	<1.87 U	<1.79 U	<1.95 U	<1.87 U	<2.2 U	<2 U	<2.15 U	<1.88 U	<1.86 U
Vanadium	7440-62-2	NS	mg/kg	9.05	5.76	NA	4.41	4.02	3.41	4.57	3.49	2.25	2.96	3.16	3.8	4.12	3.57	4.37	3.8	2.96	2.25	2.88
Zinc	7440-66-6	**109**	mg/kg	12.3	**243**	14.9	11.5	55	7.7	12.9	11.5	9.75	33.6	27.9	12.3	35.9	13.6	25.4	12.9	9.89	13	31
General Chemistry																						
Solids, Percent	SOLID	NS	Percent	96.3	94.4	96.8	96.5	96.5	96.3	97.1	95.6	96	92.9	89.5	93.4	85.7	89.5	76	83.4	77.7	88.7	89.7

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP19	EP20	EP21	EP22	EP22	EP22	EP23	EP24	EP25	EP26	EP27	EP28	EP28	EP29	EP29	EP30	EP30	EP31	EP31	EP32
			Sample Name	EP19_EL1.5	EP20_EL1.5	EP21_EL1.5	EP22_EL1	DUP04_091025	EP22_EL0	EP23_EL1	EP24_EL1	EP25_EL1.5	EP26_EL1.5	EP27_EL3	EP28_EL3	EP28_EL2	EP29_EL3	EP29_EL2	EP30_EL1	EP30_EL0	EP31_EL1	EP31_EL0	EP32_EL1
			Sample Date	09/22/2025	09/16/2025	09/16/2025	09/10/2025	09/10/2025	09/17/2025	09/05/2025	09/05/2025	09/25/2025	09/18/2025	09/22/2025	09/22/2025	09/25/2025	09/22/2025	09/25/2025	09/11/2025	09/17/2025	09/10/2025	09/17/2025	09/09/2025
			Sample Elevation	1.5	1.5	1.5	1	1	0	1	1	1.5	1.5	3	3	2	3	2	1	0	1	0	1
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																							
1,1,1,2-Tetrachloroethane	630-20-6	NS	mg/kg	<0.021 U	<0.022 U	<0.021 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.022 U	<0.005 U	<0.022 U	<0.021 U	NA	<0.024 U	NA	NA	NA	<0.0045 U	NA	NA
1,1,1-Trichloroethane	71-55-6	0.68	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,1,2-Trichloroethane	79-00-5	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,1-Dichloroethane	75-34-3	0.27	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,1-Dichloroethene	75-35-4	0.33	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,1-Dichloropropene	563-58-6	NS	mg/kg	NA	NA	NA	<0.0046 U	<0.0047 U	NA	NA	NA	NA	<0.005 U	NA	NA	NA	NA	NA	NA	NA	<0.0045 U	NA	NA
1,2,3-Trichlorobenzene	87-61-6	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,2,3-Trichloropropane	96-18-4	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	NA	NA	<0.0045 U	NA	NA
1,2,4,5-Tetramethylbenzene	95-93-2	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	120-82-1	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,2,4-Trimethylbenzene	95-63-6	3.6	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,2-Dichlorobenzene	95-50-1	1.1	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,2-Dichloroethane	107-06-2	0.02	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,2-Dichloropropane	78-87-5	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 UJ	<0.0053 UJ	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,3-Dichlorobenzene	541-73-1	2.4	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,3-Dichloropropane	142-28-9	NS	mg/kg	NA	NA	NA	<0.0046 U	<0.0047 U	NA	NA	NA	NA	<0.005 U	NA	NA	NA	NA	NA	NA	NA	<0.0045 U	NA	NA
1,4-Dichlorobenzene	106-46-7	1.8	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
1,4-Diethyl Benzene	105-05-5	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.075 U	NA	NA	NA	NA	NA	<0.12 U	NA	NA	NA	<0.063 U
2,2-Dichloropropane	594-20-7	NS	mg/kg	NA	NA	NA	<0.0046 U	<0.0047 U	NA	NA	NA	NA	<0.005 U	NA	NA	NA	NA	NA	NA	NA	<0.0045 U	NA	NA
2-Chlorotoluene	95-49-8	NS	mg/kg	NA	NA	NA	<0.0046 U	<0.0047 U	NA	NA	NA	NA	<0.005 U	NA	NA	NA	NA	NA	NA	NA	<0.0045 U	NA	NA
2-Hexanone (MBK)	591-78-6	NS	mg/kg	<0.027 U	<0.028 U	<0.026 U	<0.023 U	<0.024 U	NA	<0.0056 U	<0.0053 U	<0.027 U	<0.025 U	<0.027 U	<0.026 U	NA	<0.029 U	NA	<0.039 U	NA	<0.023 U	NA	<0.021 U
4-Chlorotoluene	106-43-4	NS	mg/kg	NA	NA	NA	<0.0046 U	<0.0047 U	NA	NA	NA	NA	<0.005 U	NA	NA	NA	NA	NA	NA	NA	<0.0045 U	NA	NA
4-Ethyltoluene	622-96-8	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	67-64-1	**0.05**	mg/kg	<0.053 U	<0.05 U	<0.05 U	<0.023 U	<0.024 U	NA	<0.011 U	0.0055 J	<0.055 U	<0.025 U	<0.055 U	<0.052 U	NA	<0.059 U	NA	0.019 JS	NA	<0.023 U	NA	<0.021 U
Acrolein	107-02-8	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	NA	NA	NA	<0.011 U	<0.011 U	<0.0055 U	<0.025 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	NA	NA	NA	NA	NA
Acrylonitrile	107-13-1	NS	mg/kg	<0.021 U	<0.022 U	<0.021 U	<0.0091 U	<0.0094 U	NA	<0.0056 U	<0.0053 U	<0.022 U	<0.01 U	<0.022 U	<0.021 U	NA	<0.024 U	NA	NA	NA	<0.009 U	NA	NA
Benzene	71-43-2	0.06	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Bromobenzene	108-86-1	NS	mg/kg	NA	NA	NA	<0.0046 U	<0.0047 U	NA	NA	NA	NA	<0.005 U	NA	NA	NA	NA	NA	NA	NA	<0.0045 U	NA	NA
Bromochloromethane	74-97-5	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Bromodichloromethane	75-27-4	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Bromoform	75-25-2	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Bromomethane	74-83-9	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Carbon Disulfide	75-15-0	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Carbon Tetrachloride	56-23-5	0.76	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Chlorobenzene	108-90-7	1.1	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Chloroethane	75-00-3	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Chloroform	67-66-3	0.37	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Chloromethane	74-87-3	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Cis-1,2-Dichloroethene	156-59-2	0.25	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Cis-1,3-Dichloropropene	10061-01-5	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Cyclohexane	110-82-7	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	NA	NA	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	NA	NA	<0.0042 U
Cymene	99-87-6	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	NA	NA	<0.0045 U	NA	NA
Dibromochloromethane	124-48-1	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Dibromomethane	74-95-3	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	NA	NA	<0.0045 U	NA	NA
Dichlorodifluoromethane	75-71-8	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Diethyl Ether (Ethyl Ether)	60-29-7	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	100-41-4	1	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Hexachlorobutadiene	87-68-3	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	NA	NA	<0.0045 U	NA	NA
Isopropylbenzene (Cumene)	98-82-8	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
M,P-Xylene	179601-23-1	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.011 U	<0.011 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Methyl Acetate	79-20-9	NS	mg/kg	<0.053 U	<0.056 U	<0.052 U	NA	NA	NA	<0.0056 U	<0.0053 U	<0.055 U	<0.05 U	<0.055 U	<0.052 U	NA	<0.059 U	NA	<0.0079 U	NA	NA	NA	<0.0042 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	mg/kg	<0.032 U	<0.034 U	<0.031 U	<0.027 U	<0.028 U	NA	0.0031 J	0.0028 J	<0.033 U	<0.025 U	<0.033 U	<0.031 U	NA	<0.035 U	NA	<0.047 U	NA	<0.027 U	NA	<0.025 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	mg/kg	<0.027 U	<0.028 U	<0.026 U	<0.023 U	<0.024 U	NA	<0.0056 UJ	<0.0053 UJ	<0.027 U	<0.025 U	<0.027 U	<0.026 U	NA	<0.029 U	NA	<0.039 U	NA	<0.023 U	NA	<0.021 U
Methylcyclohexane	108-87-2	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	NA	NA	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	NA	NA	<0.0042 U
Methylene Chloride	75-09-2	0.05	mg/kg	<0.027 U	<0.028 U	<0.026 U	<0.0046 U	<0.0047 U	NA	<0.011 U	<0.011 U	<0.027 U	<0.01 U	<0.027 U	<0.026 U	NA	<0.029 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Naphthalene	91-20-3	12	mg/kg	NA	NA	NA	<0.0046 U	<0.0047 U	NA	NA	NA	NA	<0.005 U	NA	NA	NA	NA	NA	NA	NA	<0.0045 U	NA	NA
n-Butylbenzene	104-51-8	12	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	NA	NA	<0.0045 U	NA	NA
n-Propylbenzene	103-65-1	3.9	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	NA	NA	<0.0045 U	NA	NA
o-Cymene (O-Isopropyltoluene)	527-84-4	NS	mg/kg	NA	NA	NA	<0.0046 U	<0.0047 U	NA	NA	NA	NA	<0.005 U	NA	NA	NA	NA	NA	NA	NA	<0.0045 U	NA	NA
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Sec-Butylbenzene	135-98-8	11	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	NA	NA	<0.0045 U	NA	NA
Styrene	100-42-5	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
T-Butylbenzene	98-06-6	5.9	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 UJ	<0.0053 UJ	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	NA	NA	<0.0045 U	NA	NA
Tert-Butyl Alcohol	75-65-0	NS	mg/kg	<0.11 U	<0.11 U	<0.1 U	NA	NA	NA	<0.028 U	<0.026 U	<0.11 U	<0.1 U	<0.11 U	<0.1 U	NA	<0.12 U	NA	NA	NA	NA	NA	NA
Tert-Butyl Methyl Ether (MTBE)	1634-04-4	0.93	mg/kg	<0.011 U	<0.011 U	<0.01 U	<0.0091 U	<0.0094 U	NA	<0.0056 U	<0.0053 U	<0.011 U	<0.01 U	<0.011 U	<0.01 U	NA	<0.012 U	NA	<0.016 U	NA	<0.009 U	NA	<0.0084 U
Tetrachloroethene (PCE)	127-18-4	1.3	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	0.0075	NA	0.0024 J	NA	0.0021 J	NA	0.00094 J	NA	<0.0042 U
Tetrahydrofuran	109-99-9	NS	mg/kg	NA	NA	NA	<0.0091 U	<0.0094 U	NA	NA	NA	NA	<0.01 U	NA	NA	NA	NA	NA	NA	NA	<0.009 U	NA	NA
Toluene	108-88-3	0.7	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 UJ	<0.0053 UJ	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Xylenes	1330-20-7	0.26	mg/kg	NA	NA	NA	NA	NA	NA	<0.017 U	<0.016 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trans-1,2-Dichloroethene	156-60-5	0.19	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Trans-1,3-Dichloropropene	10061-02-6	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	mg/kg	<0.011 U	<0.011 U	<0.01 U	<0.0091 U	<0.0094 U	NA	NA	NA	NA	<0.01 U	<0.011 U	<0.01 U	NA	<0.012 U	NA	NA	NA	<0.009 U	NA	NA
Trichloroethene (TCE)	79-01-6	0.47	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Trichlorofluoromethane	75-69-4	NS	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U
Vinyl Acetate	108-05-4	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Chloride	75-01-4	0.02	mg/kg	<0.0053 U	<0.0056 U	<0.0052 U	<0.0046 U	<0.0047 U	NA	<0.0056 U	<0.0053 U	<0.0055 U	<0.005 U	<0.0055 U	<0.0052 U	NA	<0.0059 U	NA	<0.0079 U	NA	<0.0045 U	NA	<0.0042 U

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP19	EP20	EP21	EP22	EP22	EP22	EP23	EP24	EP25	EP26	EP27	EP28	EP28	EP29	EP29	EP30	EP30	EP31	EP31	EP32
			Sample Name	EP19_EL1.5	EP20_EL1.5	EP21_EL1.5	EP22_EL1	DUP04_091025	EP22_EL0	EP23_EL1	EP24_EL1	EP25_EL1.5	EP26_EL1.5	EP27_EL3	EP28_EL3	EP28_EL2	EP29_EL3	EP29_EL2	EP30_EL1	EP30_EL0	EP31_EL1	EP31_EL0	EP32_EL1
			Sample Date	09/22/2025	09/16/2025	09/16/2025	09/10/2025	09/10/2025	09/17/2025	09/05/2025	09/05/2025	09/25/2025	09/18/2025	09/22/2025	09/22/2025	09/25/2025	09/22/2025	09/25/2025	09/11/2025	09/17/2025	09/10/2025	09/17/2025	09/09/2025
			Sample Elevation	1.5	1.5	1.5	1	1	0	1	1	1.5	1.5	3	3	2	3	2	1	0	1	0	1
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																							
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	mg/kg	<0.173 U	<0.176 U	<0.18 U	<0.199 UJ	<0.179 UJ	NA	<0.204 U	<0.208 U	<0.175 U	<0.188 U	<0.179 U	<0.173 U	NA	<0.172 U	NA	<0.192 U	NA	<0.201 UJ	NA	<0.415 U
1,2,4-Trichlorobenzene	120-82-1	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	95-50-1	1.1	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Diphenylhydrazine	122-66-7	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
1,3-Dichlorobenzene	541-73-1	2.4	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	106-46-7	1.8	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	mg/kg	<0.0196 U	<0.0198 U	<0.0196 U	<0.0194 U	<0.0194 U	NA	<0.0187 U	<0.0187 U	<0.019 U	<0.0198 U	<0.0196 U	<0.0198 U	NA	<0.0198 U	NA	<0.0198 U	NA	<0.0198 U	NA	<0.0392 U
2,3,4,6-Tetrachlorophenol	58-90-2	NS	mg/kg	<0.173 U	<0.176 U	<0.18 U	<0.199 UJ	<0.179 UJ	NA	<0.204 U	<0.208 U	<0.175 U	<0.188 U	<0.179 U	<0.173 U	NA	<0.172 U	NA	<0.192 U	NA	<0.201 UJ	NA	<0.415 U
2,4,5-Trichlorophenol	95-95-4	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
2,4,6-Trichlorophenol	88-06-2	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
2,4-Dichlorophenol	120-83-2	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
2,4-Dimethylphenol	105-67-9	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
2,4-Dinitrophenol	51-28-5	NS	mg/kg	<0.173 U	<0.176 U	<0.18 U	<0.199 UJ	<0.179 UJ	NA	<0.204 U	<0.208 U	<0.175 UJ	<0.188 U	<0.179 U	<0.173 U	NA	<0.172 U	NA	<0.192 U	NA	<0.201 UJ	NA	<0.415 U
2,4-Dinitrotoluene	121-14-2	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
2,6-Dinitrotoluene	606-20-2	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
2-Chloronaphthalene	91-58-7	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
2-Chlorophenol	95-57-8	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
2-Methylnaphthalene	91-57-6	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
2-Methylphenol (o-Cresol)	95-48-7	0.33	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
2-Nitroaniline	88-74-4	NS	mg/kg	<0.173 U	<0.176 U	<0.18 U	<0.199 UJ	<0.179 UJ	NA	<0.204 U	<0.208 U	<0.175 U	<0.188 U	<0.179 U	<0.173 U	NA	<0.172 U	NA	<0.192 U	NA	<0.201 UJ	NA	<0.415 U
2-Nitrophenol	88-75-5	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
3,3'-Dichlorobenzidine	91-94-1	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
3-Nitroaniline	99-09-2	NS	mg/kg	<0.173 U	<0.176 U	<0.18 U	<0.199 UJ	<0.179 UJ	NA	<0.204 U	<0.208 U	<0.175 U	<0.188 U	<0.179 U	<0.173 U	NA	<0.172 U	NA	<0.192 U	NA	<0.201 UJ	NA	<0.415 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	mg/kg	<0.173 U	<0.176 U	<0.18 U	<0.199 UJ	<0.179 UJ	NA	<0.204 U	<0.208 U	<0.175 U	<0.188 U	<0.179 U	<0.173 U	NA	<0.172 U	NA	<0.192 U	NA	<0.201 UJ	NA	<0.415 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
4-Chloro-3-Methylphenol	59-50-7	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
4-Chloroaniline	106-47-8	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
4-Nitroaniline	100-01-6	NS	mg/kg	<0.173 U	<0.176 U	<0.18 U	<0.199 UJ	<0.179 UJ	NA	<0.204 U	<0.208 U	<0.175 U	<0.188 U	<0.179 U	<0.173 U	NA	<0.172 U	NA	<0.192 U	NA	<0.201 UJ	NA	<0.415 U
4-Nitrophenol	100-02-7	NS	mg/kg	<0.173 U	<0.176 U	<0.18 U	<0.199 UJ	<0.179 UJ	NA	<0.204 U	<0.208 U	<0.175 U	<0.188 U	<0.179 U	<0.173 U	NA	<0.172 U	NA	<0.192 U	NA	<0.201 UJ	NA	<0.415 U
Acenaphthene	83-32-9	20	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	0.0636 J	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	0.0637 JD	NA	0.0551 JD	NA	0.132 D	NA	0.116 J	NA	<0.208 U
Acenaphthylene	208-96-8	100	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	0.69 J	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	0.149 D	NA	0.133 D	NA	0.0507 JD	NA	<0.1 UJ	NA	<0.208 U
Acetophenone	98-86-2	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Aniline (Phenylamine, Aminobenzene)	62-53-3	NS	mg/kg	<0.346 U	<0.353 U	<0.36 U	<0.399 UJ	<0.358 UJ	NA	<0.408 U	<0.417 U	<0.352 U	<0.376 U	<0.359 U	<0.347 U	NA	<0.345 U	NA	<0.385 U	NA	<0.402 UJ	NA	<0.832 U
Anthracene	120-12-7	100	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	0.335 J	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	0.248 D	NA	0.24 D	NA	0.374 D	NA	0.281 J	NA	<0.208 U
Atrazine	1912-24-9	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Benzaldehyde	100-52-7	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Benzidine	92-87-5	NS	mg/kg	<0.346 U	<0.353 U	<0.36 U	<0.399 UJ	<0.358 UJ	NA	<0.408 U	<0.417 U	<0.352 U	<0.376 U	<0.359 U	<0.347 U	NA	<0.345 U	NA	<0.385 U	NA	<0.402 UJ	NA	<0.832 U
Benzo(a)anthracene	56-55-3	**1**	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	**2.24 J**	0.0794 J	0.128 D	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	0.854 D	NA	0.872 D	NA	0.771 D	NA	0.605 J	NA	<0.208 U
Benzo(a)pyrene	50-32-8	**1**	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	**2.16 J**	0.0629 J	0.18 D	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	0.949 D	NA	0.894 D	NA	0.506 D	NA	0.475 J	NA	<0.208 U
Benzo(b)fluoranthene	205-99-2	**1**	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	**2.12 J**	0.0501 J	0.259 D	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	0.911 D	NA	0.812 D	NA	0.41 D	NA	0.41 J	NA	<0.208 U
Benzo(g,h,i)Perylene	191-24-2	100	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	1.26 J	0.0551 J	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	0.642 D	NA	0.572 D	NA	0.331 D	NA	0.318 J	NA	<0.208 U
Benzo(k)fluoranthene	207-08-9	**0.8**	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	**1.72 J**	0.0522 J	0.185 D	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	0.799 D	NA	0.732 D	NA	0.489 D	NA	0.406 J	NA	<0.208 U
Benzoic Acid	65-85-0	NS	mg/kg	<0.0865 UJ	<0.088 UJ	<0.0899 UJ	<0.0995 UJ	<0.0895 UJ	NA	<0.102 UJ	<0.104 UJ	<0.0878 U	<0.0939 UJ	<0.0896 U	<0.0866 UJ	NA	<0.0861 UJ	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Benzyl Alcohol	100-51-6	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Benzyl Butyl Phthalate	85-68-7	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Biphenyl (Diphenyl)	92-52-4	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Bis(2-chloroethoxy) methane	111-91-1	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Bis(2-chloroisopropyl) ether	108-60-1	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Bis(2-ethylhexyl) phthalate	117-81-7	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	0.0602 JD	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Caprolactam	105-60-2	NS	mg/kg	<0.173 U	<0.176 U	<0.18 U	<0.199 UJ	<0.179 UJ	NA	<0.204 U	<0.208 U	<0.175 U	<0.188 U	<0.179 U	<0.173 U	NA	<0.172 U	NA	<0.192 U	NA	<0.201 UJ	NA	<0.415 U
Carbazole	86-74-8	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	0.0891 J	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	0.126 D	NA	0.126 D	NA	0.161 D	NA	0.14 J	NA	<0.208 U
Chrysene	218-01-9	**1**	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	**2.66 J**	0.0858 J	0.26 D	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	0.927 D	NA	0.964 D	NA	0.74 D	NA	0.553 J	NA	<0.208 U
Dibenz(a,h)anthracene	53-70-3	**0.33**	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	**0.413 J**	<0.0895 UJ	0.0551 JD	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	0.192 D	NA	0.177 D	NA	0.13 D	NA	0.101 J	NA	<0.208 U
Dibenzofuran	132-64-9	7	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	0.074 J	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	0.0526 JD	NA	0.0448 JD	NA	0.0838 JD	NA	0.0634 J	NA	<0.208 U
Dibutyl phthalate	84-74-2	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Diethyl phthalate	84-66-2	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Dimethyl phthalate	131-11-3	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Dioctyl phthalate	117-84-0	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Diphenylamine	122-39-4	NS	mg/kg	<0.173 U	<0.176 U	<0.18 U	<0.199 UJ	<0.179 UJ	NA	<0.204 U	<0.208 U	<0.175 U	<0.188 U	<0.179 U	<0.173 U	NA	<0.172 U	NA	<0.192 U	NA	<0.201 UJ	NA	<0.415 U
Fluoranthene	206-44-0	100	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	8.68 J	0.179 J	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	1.54 D	NA	1.87 D	NA	1.36 D	NA	1.22 J	NA	<0.208 U
Fluorene	86-73-7	30	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	0.0875 J	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	0.0741 JD	NA	0.0799 JD	NA	0.139 D	NA	0.1 J	NA	<0.208 U
Hexachlorobenzene	118-74-1	0.33	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Hexachlorobutadiene	87-68-3	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Hexachlorocyclopentadiene	77-47-4	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Hexachloroethane	67-72-1	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	**1.15 J**	<0.0895 UJ	0.145 D	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	**0.614 D**	<0.0948 U	**0.569 D**	<0.192 U	0.294 D	NA	0.271 J	NA	<0.208 U
Isophorone	78-59-1	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Naphthalene	91-20-3	12	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	0.211 J	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	0.0706 JD	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Nitrobenzene	98-95-3	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
n-Nitrosodimethylamine	62-75-9	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
n-Nitrosodiphenylamine	86-30-6	NS	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Pentachlorophenol	87-86-5	0.8	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 U
Phenanthrene	85-01-8	100	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	2.63 J	0.0901 J	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	0.929 D	NA	1.21 D	NA	1.39 D	NA	1.05 J	NA	<0.208 U
Phenol	108-95-2	0.33	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	<0.0995 UJ	<0.0895 UJ	NA	<0.102 UJ	<0.104 UJ	<0.0878 U	<0.0939 U	<0.0896 U	<0.0866 U	NA	<0.0861 U	NA	<0.0962 U	NA	<0.1 UJ	NA	<0.208 UJ
Pyrene	129-00-0	100	mg/kg	<0.0865 U	<0.088 U	<0.0899 U	7.88 J	0.213 J	NA	<0.102 U	<0.104 U	<0.0878 U	<0.0939 U	<0.0896 U	1.42 D	NA	1.56 D	NA	1.97 D	NA	1.55 J	NA	<0.208 U
Pyridine	110-86-1	NS	mg/kg	<0.346 U	<0.353 U	<0.36 U	<0.399 UJ	<0.358 UJ	NA	<0.408 U	<0.417 U	<0.352 U	<0.376 U	<0.359 U	<0.347 U	NA	<0.345 U	NA	<0.385 U	NA	<0.402 UJ	NA	<0.832 U

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP19	EP20	EP21	EP22	EP22	EP22	EP23	EP24	EP25	EP26	EP27	EP28	EP28	EP29	EP29	EP30	EP30	EP31	EP31	EP32
			Sample Name	EP19_EL1.5	EP20_EL1.5	EP21_EL1.5	EP22_EL1	DUP04_091025	EP22_EL0	EP23_EL1	EP24_EL1	EP25_EL1.5	EP26_EL1.5	EP27_EL3	EP28_EL3	EP28_EL2	EP29_EL3	EP29_EL2	EP30_EL1	EP30_EL0	EP31_EL1	EP31_EL0	EP32_EL1
			Sample Date	09/22/2025	09/16/2025	09/16/2025	09/10/2025	09/10/2025	09/17/2025	09/05/2025	09/05/2025	09/25/2025	09/18/2025	09/22/2025	09/22/2025	09/25/2025	09/22/2025	09/25/2025	09/11/2025	09/17/2025	09/10/2025	09/17/2025	09/09/2025
			Sample Elevation	1.5	1.5	1.5	1	1	0	1	1	1.5	1.5	3	3	2	3	2	1	0	1	0	1
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																							
4,4'-DDD	72-54-8	**0.0033**	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	**0.0676**	<0.000379 U	**0.0054**	<0.000842 U	0.00283 D	NA	0.00319 D	NA	<0.000865 U
4,4'-DDE	72-55-9	**0.0033**	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	**0.0111**	<0.000379 U	**0.00497**	<0.000842 U	<0.00187 U	NA	0.00278 J	NA	<0.000865 U
4,4'-DDT	50-29-3	**0.0033**	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	**0.0619**	<0.000379 U	**0.0167**	<0.000842 U	**0.00669 D**	<0.00209 UP	**0.00424 D**	<0.00214 UP	<0.000865 U
Aldrin	309-00-2	0.005	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	<0.000341 U	NA	<0.000341 U	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	<0.000341 U	NA	<0.000341 U	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Alpha Chlordane	5103-71-9	0.094	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	0.00127	NA	0.000703	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Alpha Endosulfan	959-98-8	2.4	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	<0.000341 U	NA	<0.000341 U	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	<0.000341 U	NA	<0.000341 U	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Beta Endosulfan	33213-65-9	2.4	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	<0.000341 U	NA	<0.000341 U	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Chlordane (alpha and gamma)	57-74-9	NS	mg/kg	<0.00691 U	<0.00711 U	<0.00728 U	<0.0391 U	<0.0354 U	NA	<0.0411 U	<0.0419 U	<0.00695 U	<0.00748 U	<0.00712 U	0.0109	NA	<0.00682 U	NA	<0.0373 U	NA	<0.0387 U	NA	<0.0173 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	<0.000341 U	NA	<0.000341 U	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Dieldrin	60-57-1	**0.005**	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	0.00297	NA	0.000998	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Endosulfan Sulfate	1031-07-8	2.4	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	<0.000341 U	NA	<0.000341 U	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Endrin	72-20-8	0.014	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	<0.000341 U	NA	<0.000341 U	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Endrin Aldehyde	7421-93-4	NS	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	<0.000341 U	NA	<0.000341 U	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Endrin Ketone	53494-70-5	NS	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	0.0029	NA	<0.000341 U	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Gamma Bhc (Lindane)	58-89-9	0.1	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	<0.000341 U	NA	<0.000341 U	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Gamma Chlordane (Trans)	5103-74-2	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gamma-Chlordane	5566-34-7	NS	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	0.0019	NA	0.00097	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Heptachlor	76-44-8	0.042	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	<0.000341 U	NA	<0.000341 U	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Heptachlor Epoxide	1024-57-3	NS	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	<0.000341 U	NA	<0.000341 U	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Methoxychlor	72-43-5	NS	mg/kg	<0.000346 U	<0.000355 U	<0.000364 U	<0.00196 U	<0.00177 U	NA	<0.00206 U	<0.00209 U	<0.000347 U	<0.000374 U	<0.000356 U	<0.000341 U	NA	<0.000341 U	NA	<0.00187 U	NA	<0.00194 U	NA	<0.000865 U
Toxaphene	8001-35-2	NS	mg/kg	<0.0346 U	<0.0355 U	<0.0364 U	<0.196 U	<0.177 U	NA	<0.206 U	<0.209 U	<0.0347 U	<0.0374 U	<0.0356 U	<0.0341 U	NA	<0.0341 U	NA	<0.187 U	NA	<0.194 U	NA	<0.0865 U
Herbicides																							
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	mg/kg	<0.0207 U	<0.0213 U	<0.0218 U	<0.0238 U	<0.0215 U	NA	<0.0245 U	<0.0251 U	<0.021 U	<0.0226 U	<0.0213 U	<0.0208 U	NA	<0.0208 U	NA	<0.0226 U	NA	<0.0241 U	NA	<0.026 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	mg/kg	<0.0207 U	<0.0213 U	<0.0218 U	<0.0238 U	<0.0215 U	NA	<0.0245 U	<0.0251 U	<0.021 U	<0.0226 U	<0.0213 U	<0.0208 U	NA	<0.0208 U	NA	<0.0226 U	NA	<0.0241 U	NA	<0.026 U
Silvex (2,4,5-Tp)	93-72-1	3.8	mg/kg	<0.0207 U	<0.0213 U	<0.0218 U	<0.0238 U	<0.0215 U	NA	<0.0245 U	<0.0251 U	<0.021 U	<0.0226 U	<0.0213 U	<0.0208 U	NA	<0.0208 U	NA	<0.0226 U	NA	<0.0241 U	NA	<0.026 U
Polychlorinated Biphenyl																							
PCB-1016 (Aroclor 1016)	12674-11-2	NS	mg/kg	<0.0172 U	<0.0179 U	<0.0184 U	<0.0197 U	<0.0179 U	NA	<0.0208 U	<0.0212 U	<0.0175 U	<0.0189 U	<0.0177 U	<0.0172 U	NA	<0.0172 U	NA	<0.0188 U	NA	<0.0195 U	NA	<0.0437 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	mg/kg	<0.0172 U	<0.0179 U	<0.0184 U	<0.0197 U	<0.0179 U	NA	<0.0208 U	<0.0212 U	<0.0175 U	<0.0189 U	<0.0177 U	<0.0172 U	NA	<0.0172 U	NA	<0.0188 U	NA	<0.0195 U	NA	<0.0437 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	mg/kg	<0.0172 U	<0.0179 U	<0.0184 U	<0.0197 U	<0.0179 U	NA	<0.0208 U	<0.0212 U	<0.0175 U	<0.0189 U	<0.0177 U	<0.0172 U	NA	<0.0172 U	NA	<0.0188 U	NA	<0.0195 U	NA	<0.0437 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	mg/kg	<0.0172 U	<0.0179 U	<0.0184 U	<0.0197 U	<0.0179 U	NA	<0.0208 U	<0.0212 U	<0.0175 U	<0.0189 U	<0.0177 U	<0.0172 U	NA	<0.0172 U	NA	<0.0188 U	NA	<0.0195 U	NA	<0.0437 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	mg/kg	<0.0172 U	<0.0179 U	<0.0184 U	<0.0197 U	<0.0179 U	NA	<0.0208 U	<0.0212 U	<0.0175 U	<0.0189 U	<0.0177 U	<0.0172 U	NA	<0.0172 U	NA	<0.0188 U	NA	<0.0195 U	NA	<0.0437 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	mg/kg	<0.0172 U	<0.0179 U	<0.0184 U	<0.0197 U	<0.0179 U	NA	<0.0208 U	<0.0212 U	<0.0175 U	<0.0189 U	<0.0177 U	<0.0172 U	NA	<0.0172 U	NA	<0.0188 U	NA	<0.0195 U	NA	<0.0437 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	mg/kg	<0.0172 U	<0.0179 U	<0.0184 U	<0.0197 U	<0.0179 U	NA	<0.0208 U	<0.0212 U	<0.0175 U	<0.0189 U	<0.0177 U	<0.0172 U	NA	<0.0172 U	NA	<0.0188 U	NA	<0.0195 U	NA	<0.0437 U
PCB-1262 (Aroclor 1262)	37324-23-5	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1268 (Aroclor 1268)	11100-14-4	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PCBs	1336-36-3	0.1	mg/kg	<0.0172 U	<0.0179 U	<0.0184 U	<0.0197 U	<0.0179 U	NA	<0.0208 U	<0.0212 U	<0.0175 U	<0.0189 U	<0.0177 U	<0.0172 U	NA	<0.0172 U	NA	<0.0188 U	NA	<0.0195 U	NA	<0.0437 U
Metals																							
Aluminum	7429-90-5	NS	mg/kg	639	724	903	927	688	NA	530	1,170	689	831	590	1,500	NA	1,550	NA	1,900 J	NA	1,530	NA	763
Antimony	7440-36-0	NS	mg/kg	<2.18 U	<2.26 U	<2.3 UJ	<2.49 U	<2.24 U	NA	<2.61 U	<2.67 UJ	<2.21 U	<2.4 UJ	<2.25 UJ	<2.18 U	NA	<2.17 U	NA	<2.41 U	NA	<2.52 U	NA	<2.75 U
Arsenic	7440-38-2	13	mg/kg	<1.31 U	1.78	1.48	<1.5 U	<1.35 U	NA	<1.57 U	<1.6 U	<1.32 U	1.63	<1.35 U	1.52	NA	1.47	NA	2.23	NA	1.85	NA	<1.65 U
Barium	7440-39-3	**350**	mg/kg	4.38	5.02	6.78	10.4	7.62	NA	2.61	4.12	4.81	4.56	3.39	50.9	NA	35.6	NA	48.9 J	NA	27.8	NA	5.29
Beryllium	7440-41-7	7.2	mg/kg	<0.044 U	<0.046 U	<0.046 U	<0.05 U	<0.045 U	NA	<0.053 U	<0.054 U	<0.044 U	<0.048 U	<0.045 U	<0.044 U	NA	<0.044 U	NA	<0.049 U	NA	<0.051 U	NA	<0.055 U
Cadmium	7440-43-9	2.5	mg/kg	<0.262 U	<0.271 U	<0.277 U	<0.299 U	<0.269 U	NA	<0.314 U	<0.321 U	<0.265 U	<0.288 U	<0.27 U	<0.261 U	NA	<0.261 U	NA	<0.289 U	NA	<0.302 U	NA	<0.33 U
Calcium	7440-70-2	NS	mg/kg	386	460	622	1,360 J	787 J	NA	299	514	609 J	554	392	1,900	NA	4,680	NA	3,910 J	NA	5,200	NA	510
Chromium, Hexavalent	18540-29-9	**1**	mg/kg	<0.523 U	<0.542 U	<0.553 U	<0.599 U	<0.538 U	NA	<0.627 U	<0.641 U	<0.53 U	<0.576 U	<0.539 U	<0.523 U	NA	<0.522 U	NA	<0.578 U	NA	**1.05**	<0.651 U	<0.66 U
Chromium, Total	7440-47-3	NS	mg/kg	2.93	3.4	5.49	4.41	3.35	NA	2.63	4.26	3.99	5.07	2.65	5.34	NA	5.7	NA	6.83 J	NA	5.71	NA	5.21
Chromium, Trivalent	16065-83-1	30	mg/kg	2.93	3.4	5.49	4.41	3.35	NA	2.63	4.26	3.99	5.07	2.65	5.34	NA	5.7	NA	6.83	NA	4.66	NA	5.21
Cobalt	7440-48-4	NS	mg/kg	0.41	0.37	0.645	0.619	0.44	NA	<0.418 U	0.662	0.539	0.48	<0.359 U	1.18	NA	1.25	NA	1.55 J	NA	1.13	NA	0.847
Copper	7440-50-8	50	mg/kg	<1.75 U	<1.81 U	<1.84 U	2.03	<1.79 U	NA	<2.09 U	<2.14 U	<1.77 U	<1.92 U	<1.8 U	12.8	NA	7.72	NA	8.22	NA	8.36	NA	<2.2 U
Cyanide	57-12-5	27	mg/kg	<0.523 U	<0.542 U	<0.553 U	<0.599 U	<0.538 U	NA	<0.627 U	<0.641 U	<0.53 U	<0.576 U	<0.539 U	<0.523 U	NA	<0.522 U	NA	<0.578 U	NA	<0.604 U	NA	<0.66 U
Iron	7439-89-6	NS	mg/kg	1,130	1,230	1,600	1,380	1,240	NA	909	1,650	1,120 J	1,730 J	944	2,730	NA	3,200	NA	3,090 J	NA	2,590	NA	1,790
Lead	7439-92-1	**63**	mg/kg	1.59	2.3	3.26	12.9	8.2	NA	1.86	1.76	2	2.86	1.53	**80.8**	1.79	**67.9**	1.79	**84.8 J**	3.3	56.8	NA	4.29
Magnesium	7439-95-4	NS	mg/kg	220	250	311	357	262	NA	185	421	265	294	216	551	NA	1,510	NA	1,020 J	NA	881	NA	284
Manganese	7439-96-5	1600	mg/kg	24.1	27.5	43.9	37.1	27.3	NA	20.9	21.9	25.3	43.9	19.9	44.2	NA	57.9	NA	66	NA	56.1	NA	34.4
Mercury	7439-97-6	**0.18**	mg/kg	<0.0314 U	<0.0325 U	<0.0332 U	<0.0359 U	0.035	NA	<0.0376 U	<0.0385 U	<0.0318 U	<0.0346 U	<0.0323 U	0.0611	NA	0.116	NA	0.0522	NA	0.0861	NA	<0.0396 U
Nickel	7440-02-0	30	mg/kg	1.06	<0.9 U	0.95	1.47	1.12	NA	<1.04 U	1.99	1.33	<0.957 U	0.925	4.07	NA	3.49	NA	3.69 J	NA	3.39	NA	1.25
Potassium	7440-09-7	NS	mg/kg	109	155	186	189	145	NA	131	299	156 B	160	112	220	NA	269	NA	440 J	NA	313	NA	174
Selenium	7782-49-2	3.9	mg/kg	<2.18 U	<2.26 U	<2.3 U	<2.49 U	<2.24 U	NA	<2.61 U	<2.67 U	<2.21 U	<2.4 U	<2.25 U	<2.18 U	NA	<2.17 U	NA	<2.41 U	NA	<2.52 U	NA	<2.75 U
Silver	7440-22-4	2	mg/kg	<0.44 U	<0.455 U	<0.465 U	<0.503 U	<0.452 U	NA	<0.527 U	<0.539 U	<0.445 U	<0.484 U	<0.453 U	<0.439 U	NA	<0.438 U	NA	<0.486 U	NA	<0.508 U	NA	<0.554 U
Sodium	7440-23-5	NS	mg/kg	<43.6 U	47.5	49	124 J	113 J	NA	85.4	145	74.5	<48 U	55.4	114	NA	99.7	NA	141	NA	150 J	NA	121
Thallium	7440-28-0	NS	mg/kg	<1.75 U	<1.81 U	<1.85 U	<2 U	<1.8 U	NA	<2.1 U	<2.14 U	<1.77 U	<1.92 U	<1.8 U	<1.75 U	NA	<1.74 U	NA	<1.93 U	NA	<2.02 U	NA	<2.2 U
Vanadium	7440-62-2	NS	mg/kg	3.04	3.15	6.26	3.89	3.27	NA	2.4	3.69	3.62	5.51	2.47	5.99	NA	6.6	NA	7.78 J	NA	6.6	NA	5.6
Zinc	7440-66-6	**109**	mg/kg	29	8.89	8.97	22.1	18	NA	9.6	25	7.87	37.6	18	67.1	NA	89.4	NA	59.1 J	NA	70.8	NA	44.1
General Chemistry																							
Solids, Percent	SOLID	NS	Percent	95.5	92.3	90.4	83.5	92.9	77.5	79.7	78	94.4	86.8	92.8	95.7	86.5	95.9	76.4	86.4	78.4	82.7	76.8	75.8

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP33	EP33	EP34	EP34	EP35	EP35	EP36	EP36	EP37	EP37	EP37	EP38	EP38	EP39	EP39	EP39	EP40	EP41	EP41
			Sample Name	EP33_EL2	DUP05_092325	EP34_EL2	EP34_EL1	EP35_EL2	EP35_EL1	EP36_EL7	EP36_EL6	EP37_EL7	EP37_EL5.5	EP37_EL5	EP38_EL3	EP38_EL1	EP39_EL3	EP39_EL1	EP39_EL0	EP40_EL0	EP41_EL6	EP41_EL4
			Sample Date	09/23/2025	09/23/2025	09/23/2025	09/29/2025	09/23/2025	09/29/2025	08/27/2025	09/11/2025	08/27/2025	09/11/2025	09/18/2025	08/27/2025	09/11/2025	08/27/2025	09/11/2025	09/17/2025	09/03/2025	04/16/2025	04/28/2025
			Sample Elevation	2	2	2	1	2	1	7	5.5	7	5.5	5	3	1	3	1	0	0	6	4
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																						
1,1,1,2-Tetrachloroethane	630-20-6	NS	mg/kg	<0.045 U	<0.025 U	<0.023 U	NA	<0.024 U	NA	<0.0061 U	NA	<0.0063 U	NA	NA	<0.0063 U	NA	<0.0055 U	NA	NA	<0.0092 U	<0.0005 U	NA
1,1,1-Trichloroethane	71-55-6	0.68	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.0005 U	NA
1,1,2,2-Tetrachloroethane	79-34-5	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.0005 U	NA
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	NA	NA
1,1,2-Trichloroethane	79-00-5	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.001 U	NA
1,1-Dichloroethane	75-34-3	0.27	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.001 U	NA
1,1-Dichloroethene	75-35-4	0.33	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.001 U	NA
1,1-Dichloropropene	563-58-6	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0005 U	NA
1,2,3-Trichlorobenzene	87-61-6	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.002 U	NA
1,2,3-Trichloropropane	96-18-4	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	NA	<0.0063 U	NA	NA	<0.0063 U	NA	<0.0055 U	NA	NA	<0.0092 U	<0.002 U	NA
1,2,4,5-Tetramethylbenzene	95-93-2	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.002 U	NA
1,2,4-Trichlorobenzene	120-82-1	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.002 U	NA
1,2,4-Trimethylbenzene	95-63-6	3.6	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.002 U	NA
1,2-Dibromo-3-Chloropropane	96-12-8	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.003 U	NA
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.001 U	NA
1,2-Dichlorobenzene	95-50-1	1.1	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.002 U	NA
1,2-Dichloroethane	107-06-2	0.02	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.001 U	NA
1,2-Dichloropropane	78-87-5	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 UJ	<0.001 U	NA
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.002 U	NA
1,3-Dichlorobenzene	541-73-1	2.4	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.002 U	NA
1,3-Dichloropropane	142-28-9	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.002 U	NA
1,4-Dichlorobenzene	106-46-7	1.8	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.002 U	NA
1,4-Diethyl Benzene	105-05-5	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0004 J	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	mg/kg	NA	NA	NA	NA	NA	NA	NA	<0.076 U	NA	<0.13 U	NA	NA	<0.11 U	NA	<0.12 U	NA	NA	<0.081 U	NA
2,2-Dichloropropane	594-20-7	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.002 U	NA
2-Chlorotoluene	95-49-8	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.002 U	NA
2-Hexanone (MBK)	591-78-6	NS	mg/kg	<0.057 U	<0.032 U	<0.029 U	NA	<0.03 U	NA	<0.0061 U	<0.025 U	<0.0063 U	<0.042 U	NA	<0.0063 U	<0.036 U	<0.0055 U	<0.04 U	NA	<0.0092 U	<0.01 U	NA
4-Chlorotoluene	106-43-4	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.002 U	NA
4-Ethyltoluene	622-96-8	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.002 U	NA
Acetone	67-64-1	**0.05**	mg/kg	<0.11 U	<0.063 U	<0.057 U	NA	<0.06 U	NA	0.011 J	<0.025 U	0.0091 J	<0.042 U	NA	0.024 J	<0.036 U	0.0072 J	<0.04 U	NA	<0.018 U	0.0056 J	NA
Acrolein	107-02-8	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.012 U	NA	<0.013 U	NA	NA	<0.013 U	NA	<0.011 U	NA	NA	<0.018 U	NA	NA
Acrylonitrile	107-13-1	NS	mg/kg	<0.045 U	<0.025 U	<0.023 U	NA	<0.024 U	NA	<0.0061 U	NA	<0.0063 U	NA	NA	<0.0063 U	NA	<0.0055 U	NA	NA	<0.0092 U	<0.004 U	NA
Benzene	71-43-2	0.06	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.0005 U	NA
Bromobenzene	108-86-1	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.002 U	NA
Bromochloromethane	74-97-5	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.002 U	NA
Bromodichloromethane	75-27-4	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.0005 U	NA
Bromoform	75-25-2	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.004 U	NA
Bromomethane	74-83-9	NS	mg/kg	<0.011 U	<0.0063 UJ	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.002 U	NA
Carbon Disulfide	75-15-0	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.01 U	NA
Carbon Tetrachloride	56-23-5	0.76	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.001 U	NA
Chlorobenzene	108-90-7	1.1	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.0005 U	NA
Chloroethane	75-00-3	NS	mg/kg	<0.011 U	<0.0063 UJ	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.002 U	NA
Chloroform	67-66-3	0.37	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.0015 U	NA
Chloromethane	74-87-3	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.004 U	NA
Cis-1,2-Dichloroethene	156-59-2	0.25	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.001 U	NA
Cis-1,3-Dichloropropene	10061-01-5	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.0005 U	NA
Cyclohexane	110-82-7	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	NA	NA
Cymene	99-87-6	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	NA	<0.0063 U	NA	NA	<0.0063 U	NA	<0.0055 U	NA	NA	<0.0092 U	<0.001 U	NA
Dibromochloromethane	124-48-1	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.001 U	NA
Dibromomethane	74-95-3	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	NA	<0.0063 U	NA	NA	<0.0063 U	NA	<0.0055 U	NA	NA	<0.0092 U	<0.002 U	NA
Dichlorodifluoromethane	75-71-8	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.01 U	NA
Diethyl Ether (Ethyl Ether)	60-29-7	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.002 U	NA
Ethylbenzene	100-41-4	1	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.001 U	NA
Hexachlorobutadiene	87-68-3	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	NA	<0.0063 U	NA	NA	<0.0063 U	NA	<0.0055 U	NA	NA	<0.0092 U	<0.004 U	NA
Isopropylbenzene (Cumene)	98-82-8	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.001 U	NA
M,P-Xylene	179601-23-1	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.012 U	<0.0051 U	<0.013 U	<0.0084 U	NA	<0.013 U	<0.0072 U	<0.011 U	<0.008 U	NA	<0.018 U	<0.002 U	NA
Methyl Acetate	79-20-9	NS	mg/kg	<0.11 U	<0.063 U	<0.057 U	NA	<0.06 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	NA	NA
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	mg/kg	<0.068 U	<0.038 U	<0.034 U	NA	<0.036 U	NA	<0.0061 U	<0.03 U	<0.0063 U	<0.05 U	NA	<0.0063 U	<0.043 U	<0.0055 U	<0.048 U	NA	<0.0092 U	<0.01 U	NA
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	mg/kg	<0.057 U	<0.032 U	<0.029 U	NA	<0.03 U	NA	<0.0061 U	<0.025 U	<0.0063 U	<0.042 U	NA	<0.0063 U	<0.036 U	<0.0055 U	<0.04 U	NA	<0.0092 UJ	<0.01 U	NA
Methylcyclohexane	108-87-2	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	NA	NA
Methylene Chloride	75-09-2	0.05	mg/kg	<0.057 U	<0.032 U	<0.029 U	NA	<0.03 U	NA	<0.012 U	<0.0051 U	<0.013 U	<0.0084 U	NA	<0.013 U	<0.0072 U	<0.011 U	<0.008 U	NA	<0.018 U	<0.005 U	NA
Naphthalene	91-20-3	12	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.004 U	NA
n-Butylbenzene	104-51-8	12	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	NA	<0.0063 U	NA	NA	<0.0063 U	NA	<0.0055 U	NA	NA	<0.0092 U	<0.001 U	NA
n-Propylbenzene	103-65-1	3.9	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	NA	<0.0063 U	NA	NA	<0.0063 U	NA	<0.0055 U	NA	NA	<0.0092 U	<0.001 U	NA
o-Cymene (O-Isopropyltoluene)	527-84-4	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.001 U	NA
Sec-Butylbenzene	135-98-8	11	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	NA	<0.0063 U	NA	NA	<0.0063 U	NA	<0.0055 U	NA	NA	<0.0092 U	<0.001 U	NA
Styrene	100-42-5	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.001 U	NA
T-Butylbenzene	98-06-6	5.9	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	NA	<0.0063 U	NA	NA	<0.0063 U	NA	<0.0055 U	NA	NA	<0.0092 U	<0.002 U	NA
Tert-Butyl Alcohol	75-65-0	NS	mg/kg	<0.23 U	<0.13 U	<0.11 U	NA	<0.12 U	NA	<0.03 U	NA	<0.032 U	NA	NA	<0.032 U	NA	<0.027 U	NA	NA	<0.046 UJ	NA	NA
Tert-Butyl Methyl Ether (MTBE)	1634-04-4	0.93	mg/kg	<0.023 U	<0.013 U	<0.011 U	NA	<0.012 U	NA	<0.0061 U	<0.01 U	<0.0063 U	<0.017 U	NA	<0.0063 U	<0.014 U	<0.0055 U	<0.016 U	NA	<0.0092 U	<0.002 U	NA
Tetrachloroethene (PCE)	127-18-4	1.3	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	0.0091	0.001 J	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.0005 U	NA
Tetrahydrofuran	109-99-9	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	108-88-3	0.7	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 UJ	<0.001 U	NA
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.001 U	NA
Total Xylenes	1330-20-7	0.26	mg/kg	NA	NA	NA	NA	NA	NA	<0.018 U	NA	<0.019 U	NA	NA	<0.019 U	NA	<0.016 U	NA	NA	<0.028 U	<0.001 U	NA
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0005 U	NA
Trans-1,2-Dichloroethene	156-60-5	0.19	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.0015 U	NA
Trans-1,3-Dichloropropene	10061-02-6	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.001 U	NA
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	mg/kg	<0.023 U	NA	<0.011 U	NA	<0.012 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.005 U	NA
Trichloroethene (TCE)	79-01-6	0.47	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.0005 U	NA
Trichlorofluoromethane	75-69-4	NS	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.004 U	NA
Vinyl Acetate	108-05-4	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.01 U	NA
Vinyl Chloride	75-01-4	0.02	mg/kg	<0.011 U	<0.0063 U	<0.0057 U	NA	<0.006 U	NA	<0.0061 U	<0.0051 U	<0.0063 U	<0.0084 U	NA	<0.0063 U	<0.0072 U	<0.0055 U	<0.008 U	NA	<0.0092 U	<0.001 U	NA

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP33	EP33	EP34	EP34	EP35	EP35	EP36	EP36	EP37	EP37	EP37	EP38	EP38	EP39	EP39	EP39	EP40	EP41	EP41
			Sample Name	EP33_EL2	DUP05_092325	EP34_EL2	EP34_EL1	EP35_EL2	EP35_EL1	EP36_EL7	EP36_EL6	EP37_EL7	EP37_EL5.5	EP37_EL5	EP38_EL3	EP38_EL1	EP39_EL3	EP39_EL1	EP39_EL0	EP40_EL0	EP41_EL6	EP41_EL4
			Sample Date	09/23/2025	09/23/2025	09/23/2025	09/29/2025	09/23/2025	09/29/2025	08/27/2025	09/11/2025	08/27/2025	09/11/2025	09/18/2025	08/27/2025	09/11/2025	08/27/2025	09/11/2025	09/17/2025	09/03/2025	04/16/2025	04/28/2025
			Sample Elevation	2	2	2	1	2	1	7	5.5	7	5.5	5	3	1	3	1	0	0	6	4
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																						
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	mg/kg	<0.174 U	<0.172 U	<0.173 U	NA	<0.173 U	NA	<0.175 U	NA	<0.176 U	NA	NA	<0.208 U	NA	<0.209 U	NA	NA	<0.211 U	<0.18 U	NA
1,2,4-Trichlorobenzene	120-82-1	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.18 U	NA
1,2-Dichlorobenzene	95-50-1	1.1	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.18 U	NA
1,2-Diphenylhydrazine	122-66-7	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	NA	NA
1,3-Dichlorobenzene	541-73-1	2.4	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.18 U	NA
1,4-Dichlorobenzene	106-46-7	1.8	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.18 U	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	mg/kg	<0.0194 U	<0.0192 U	<0.0194 U	NA	<0.0194 U	NA	<0.0192 U	NA	<0.0198 U	NA	NA	<0.0198 U	NA	<0.0198 U	NA	NA	<0.0198 U	<0.027 U	NA
2,3,4,6-Tetrachlorophenol	58-90-2	NS	mg/kg	<0.174 U	<0.172 U	<0.173 U	NA	<0.173 U	NA	<0.175 U	NA	<0.176 U	NA	NA	<0.208 U	NA	<0.209 U	NA	NA	<0.211 U	NA	NA
2,4,5-Trichlorophenol	95-95-4	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
2,4,6-Trichlorophenol	88-06-2	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.11 U	NA
2,4-Dichlorophenol	120-83-2	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.16 U	NA
2,4-Dimethylphenol	105-67-9	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
2,4-Dinitrophenol	51-28-5	NS	mg/kg	<0.174 U	<0.172 U	<0.173 U	NA	<0.173 U	NA	<0.175 UJ	NA	<0.176 UJ	NA	NA	<0.208 UJ	NA	<0.209 UJ	NA	NA	<0.211 U	<0.85 U	NA
2,4-Dinitrotoluene	121-14-2	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
2,6-Dinitrotoluene	606-20-2	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
2-Chloronaphthalene	91-58-7	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
2-Chlorophenol	95-57-8	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
2-Methylnaphthalene	91-57-6	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	0.045 J	NA
2-Methylphenol (o-Cresol)	95-48-7	0.33	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
2-Nitroaniline	88-74-4	NS	mg/kg	<0.174 U	<0.172 U	<0.173 U	NA	<0.173 U	NA	<0.175 U	NA	<0.176 U	NA	NA	<0.208 U	NA	<0.209 U	NA	NA	<0.211 U	<0.18 U	NA
2-Nitrophenol	88-75-5	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.38 U	NA
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.26 U	NA
3,3'-Dichlorobenzidine	91-94-1	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
3-Nitroaniline	99-09-2	NS	mg/kg	<0.174 U	<0.172 U	<0.173 U	NA	<0.173 U	NA	<0.175 U	NA	<0.176 U	NA	NA	<0.208 U	NA	<0.209 U	NA	NA	<0.211 U	<0.18 U	NA
4,6-Dinitro-2-Methylphenol	534-52-1	NS	mg/kg	<0.174 U	<0.172 U	<0.173 U	NA	<0.173 U	NA	<0.175 U	NA	<0.176 U	NA	NA	<0.208 U	NA	<0.209 U	NA	NA	<0.211 U	<0.46 U	NA
4-Bromophenyl Phenyl Ether	101-55-3	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
4-Chloro-3-Methylphenol	59-50-7	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
4-Chloroaniline	106-47-8	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
4-Nitroaniline	100-01-6	NS	mg/kg	<0.174 U	<0.172 U	<0.173 U	NA	<0.173 U	NA	<0.175 U	NA	<0.176 U	NA	NA	<0.208 U	NA	<0.209 U	NA	NA	<0.211 U	<0.18 U	NA
4-Nitrophenol	100-02-7	NS	mg/kg	<0.174 U	<0.172 U	<0.173 U	NA	<0.173 U	NA	<0.175 U	NA	<0.176 U	NA	NA	<0.208 U	NA	<0.209 U	NA	NA	<0.211 U	<0.25 U	NA
Acenaphthene	83-32-9	20	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	0.19	NA
Acenaphthylene	208-96-8	100	mg/kg	<0.0871 U	<0.0861 U	0.0442 JD	NA	0.0559 JD	NA	0.147 D	NA	0.0485 JD	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	0.42	NA
Acetophenone	98-86-2	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
Aniline (Phenylamine, Aminobenzene)	62-53-3	NS	mg/kg	<0.349 U	<0.345 U	<0.346 U	NA	<0.346 U	NA	<0.351 U	NA	<0.352 U	NA	NA	<0.417 U	NA	<0.42 U	NA	NA	<0.422 U	NA	NA
Anthracene	120-12-7	100	mg/kg	<0.0871 U	<0.0861 U	0.0587 JD	NA	0.0815 JD	NA	0.126 D	NA	0.108 D	NA	NA	0.0567 JD	NA	<0.105 U	NA	NA	<0.105 U	0.63	NA
Atrazine	1912-24-9	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	NA	NA
Benzaldehyde	100-52-7	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	NA	NA
Benzidine	92-87-5	NS	mg/kg	<0.349 U	<0.345 U	<0.346 U	NA	<0.346 U	NA	<0.351 U	NA	<0.352 U	NA	NA	<0.417 U	NA	<0.42 U	NA	NA	<0.422 U	NA	NA
Benzo(a)anthracene	56-55-3	**1**	mg/kg	<0.0871 U	<0.0861 U	0.179 D	NA	0.32 D	NA	0.546 D	NA	0.385 D	NA	NA	0.167 D	NA	0.0646 JD	NA	NA	0.0615 JD	**2.3**	<0.1 U
Benzo(a)pyrene	50-32-8	**1**	mg/kg	<0.0871 U	<0.0861 U	0.126 D	NA	0.255 D	NA	0.481 D	NA	0.241 D	NA	NA	0.117 D	NA	<0.105 U	NA	NA	0.0556 JD	**2.3**	<0.14 U
Benzo(b)fluoranthene	205-99-2	**1**	mg/kg	<0.0871 U	<0.0861 U	0.123 D	NA	0.291 D	NA	0.424 D	NA	0.218 D	NA	NA	0.126 D	NA	<0.105 U	NA	NA	<0.105 U	**3**	<0.1 U
Benzo(g,h,i)Perylene	191-24-2	100	mg/kg	<0.0871 U	<0.0861 U	0.123 D	NA	0.196 D	NA	0.351 D	NA	0.186 D	NA	NA	0.0967 JD	NA	<0.105 U	NA	NA	<0.105 U	1.4	NA
Benzo(k)fluoranthene	207-08-9	**0.8**	mg/kg	<0.0871 U	<0.0861 U	0.124 D	NA	0.26 D	NA	0.436 D	NA	0.205 D	NA	NA	0.102 JD	NA	<0.105 U	NA	NA	<0.105 U	0.76	NA
Benzoic Acid	65-85-0	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.58 U	NA
Benzyl Alcohol	100-51-6	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
Benzyl Butyl Phthalate	85-68-7	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
Biphenyl (Diphenyl)	92-52-4	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.4 U	NA
Bis(2-chloroethoxy) methane	111-91-1	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.19 U	NA
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.16 U	NA
Bis(2-chloroisopropyl) ether	108-60-1	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.21 U	NA
Bis(2-ethylhexyl) phthalate	117-81-7	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
Caprolactam	105-60-2	NS	mg/kg	<0.174 U	<0.172 U	<0.173 U	NA	<0.173 U	NA	<0.175 U	NA	<0.176 U	NA	NA	<0.208 U	NA	<0.209 U	NA	NA	<0.211 U	NA	NA
Carbazole	86-74-8	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	0.0456 JD	NA	0.0526 JD	NA	0.0457 JD	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	0.29	NA
Chrysene	218-01-9	**1**	mg/kg	<0.0871 U	<0.0861 U	0.195 D	NA	0.315 D	NA	0.573 D	NA	0.403 D	NA	NA	0.172 D	NA	0.0629 JD	NA	NA	0.0657 JD	**2.5**	<0.1 U
Dibenz(a,h)anthracene	53-70-3	**0.33**	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	0.0483 JD	NA	0.0996 D	NA	0.0569 JD	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	0.32	NA
Dibenzofuran	132-64-9	7	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	0.087 J	NA
Dibutyl phthalate	84-74-2	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	0.0457 JD	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
Diethyl phthalate	84-66-2	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
Dimethyl phthalate	131-11-3	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
Dioctyl phthalate	117-84-0	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
Diphenylamine	122-39-4	NS	mg/kg	<0.174 U	<0.172 U	<0.173 U	NA	<0.173 U	NA	<0.175 U	NA	<0.176 U	NA	NA	<0.208 U	NA	<0.209 U	NA	NA	<0.211 U	NA	NA
Fluoranthene	206-44-0	100	mg/kg	<0.0871 U	<0.0861 U	0.356 D	NA	0.534 D	NA	1.12 D	NA	0.777 D	NA	NA	0.321 D	NA	0.0989 JD	NA	NA	0.134 D	5	NA
Fluorene	86-73-7	30	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	0.2	NA
Hexachlorobenzene	118-74-1	0.33	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.11 U	NA
Hexachlorobutadiene	87-68-3	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
Hexachlorocyclopentadiene	77-47-4	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.51 U	NA
Hexachloroethane	67-72-1	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.14 U	NA
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	mg/kg	<0.0871 U	<0.0861 U	0.098 D	NA	0.224 D	NA	0.274 D	NA	0.156 D	NA	NA	0.075 JD	NA	<0.105 U	NA	NA	<0.105 U	**1.3**	<0.14 U
Isophorone	78-59-1	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.16 U	NA
Naphthalene	91-20-3	12	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	0.11 J	NA
Nitrobenzene	98-95-3	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.16 U	NA
n-Nitrosodimethylamine	62-75-9	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	NA	NA
n-Nitrosodi-N-Propylamine	621-64-7	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
n-Nitrosodiphenylamine	86-30-6	NS	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.14 U	NA
Pentachlorophenol	87-86-5	0.8	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.14 U	NA
Phenanthrene	85-01-8	100	mg/kg	<0.0871 U	<0.0861 U	0.191 D	NA	0.357 D	NA	0.584 D	NA	0.605 D	NA	NA	0.277 D	NA	0.0528 JD	NA	NA	0.116 D	2.9	NA
Phenol	108-95-2	0.33	mg/kg	<0.0871 U	<0.0861 U	<0.0864 U	NA	<0.0864 U	NA	<0.0878 U	NA	<0.0879 U	NA	NA	<0.104 U	NA	<0.105 U	NA	NA	<0.105 U	<0.18 U	NA
Pyrene	129-00-0	100	mg/kg	<0.0871 U	<0.0861 U	0.422 D	NA	0.929 D	NA	1.42 D	NA	1.23 D	NA	NA	0.494 D	NA	0.175 D	NA	NA	0.141 D	4.8	NA
Pyridine	110-86-1	NS	mg/kg	<0.349 U	<0.345 U	<0.346 U	NA	<0.346 U	NA	<0.351 U	NA	<0.352 U	NA	NA	<0.417 U	NA	<0.42 U	NA	NA	<0.422 U	NA	NA

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP33	EP33	EP34	EP34	EP35	EP35	EP36	EP36	EP37	EP37	EP37	EP38	EP38	EP39	EP39	EP39	EP40	EP41	EP41
			Sample Name	EP33_EL2	DUP05_092325	EP34_EL2	EP34_EL1	EP35_EL2	EP35_EL1	EP36_EL7	EP36_EL6	EP37_EL7	EP37_EL5.5	EP37_EL5	EP38_EL3	EP38_EL1	EP39_EL3	EP39_EL1	EP39_EL0	EP40_EL0	EP41_EL6	EP41_EL4
			Sample Date	09/23/2025	09/23/2025	09/23/2025	09/29/2025	09/23/2025	09/29/2025	08/27/2025	09/11/2025	08/27/2025	09/11/2025	09/18/2025	08/27/2025	09/11/2025	08/27/2025	09/11/2025	09/17/2025	09/03/2025	04/16/2025	04/28/2025
			Sample Elevation	2	2	2	1	2	1	7	5.5	7	5.5	5	3	1	3	1	0	0	6	4
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																						
4,4'-DDD	72-54-8	**0.0033**	mg/kg	<0.00173 U	<0.000342 U	**0.0037 D**	<0.00201 U	**0.00404 D**	<0.00184 U	**0.0363 D**	<0.0017 U	**0.00532 D**	<0.00169 U	NA	<0.00208 U	NA	<0.00419 U	**0.0129 D**	<0.00215 UP	<0.00207 U	0.00121 J	NA
4,4'-DDE	72-55-9	**0.0033**	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	**0.00533 D**	<0.0017 U	**0.00632 D**	**0.004 D**	<0.000339 U	<0.00208 U	NA	<0.00419 U	0.00248 D	NA	<0.00207 U	0.00166 J	NA
4,4'-DDT	50-29-3	**0.0033**	mg/kg	<0.00173 U	<0.000342 U	**0.00555 D**	<0.00201 U	**0.00446 D**	<0.00184 U	**0.0279 D**	<0.0017 U	**0.0252 D**	**0.00747 D**	<0.000339 U	<0.00208 U	NA	<0.00419 U	**0.00672 D**	<0.00215 UP	<0.00207 U	0.00258 J	NA
Aldrin	309-00-2	0.005	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	<0.00175 U	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	<0.00168 U	NA
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	<0.00175 U	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	<0.000701 U	NA
Alpha Chlordane	5103-71-9	0.094	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	<0.00175 U	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	0.00521	NA
Alpha Endosulfan	959-98-8	2.4	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	<0.00175 U	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	<0.00168 U	NA
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	<0.00175 U	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	<0.00168 U	NA
Beta Endosulfan	33213-65-9	2.4	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	<0.00175 U	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	<0.00168 U	NA
Chlordane (alpha and gamma)	57-74-9	NS	mg/kg	<0.0346 U	<0.00684 U	<0.035 U	NA	<0.0341 U	NA	<0.0351 U	NA	<0.0351 U	NA	NA	<0.0417 U	NA	<0.0838 U	NA	NA	<0.0413 U	0.0325	NA
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	<0.00175 U	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	<0.00168 U	NA
Dieldrin	60-57-1	**0.005**	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	0.00238 D	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	<0.00105 U	NA
Endosulfan Sulfate	1031-07-8	2.4	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	<0.00175 U	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	<0.000701 U	NA
Endrin	72-20-8	0.014	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	<0.00175 U	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	<0.000701 U	NA
Endrin Aldehyde	7421-93-4	NS	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	<0.00175 U	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	<0.0021 U	NA
Endrin Ketone	53494-70-5	NS	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	<0.00175 U	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	<0.00168 U	NA
Gamma Bhc (Lindane)	58-89-9	0.1	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	<0.00175 U	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	<0.000701 U	NA
Gamma Chlordane (Trans)	5103-74-2	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00454	NA
Gamma-Chlordane	5566-34-7	NS	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	<0.00175 U	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	NA	NA
Heptachlor	76-44-8	0.042	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	<0.00175 U	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	<0.000841 U	NA
Heptachlor Epoxide	1024-57-3	NS	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	<0.00175 U	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	<0.00315 U	NA
Methoxychlor	72-43-5	NS	mg/kg	<0.00173 U	<0.000342 U	<0.00175 U	NA	<0.0017 U	NA	<0.00175 U	NA	<0.00176 U	NA	NA	<0.00208 U	NA	<0.00419 U	NA	NA	<0.00207 U	<0.00315 U	NA
Toxaphene	8001-35-2	NS	mg/kg	<0.173 U	<0.0342 U	<0.175 U	NA	<0.17 U	NA	<0.175 U	NA	<0.176 U	NA	NA	<0.208 U	NA	<0.419 U	NA	NA	<0.207 U	<0.0315 U	NA
Herbicides																						
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	mg/kg	<0.0209 U	<0.0208 U	<0.0211 U	NA	<0.0205 U	NA	<0.0213 U	NA	<0.0214 U	NA	NA	<0.0253 U	NA	<0.0255 U	NA	NA	<0.0376 U	<0.178 U	NA
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	mg/kg	<0.0209 U	<0.0208 U	<0.0211 U	NA	<0.0205 U	NA	<0.0213 U	NA	<0.0214 U	NA	NA	<0.0253 U	NA	<0.0255 U	NA	NA	<0.0376 U	<0.178 U	NA
Silvex (2,4,5-Tp)	93-72-1	3.8	mg/kg	<0.0209 U	<0.0208 U	<0.0211 U	NA	<0.0205 U	NA	<0.0213 U	NA	<0.0214 U	NA	NA	<0.0253 U	NA	<0.0255 U	NA	NA	<0.0376 U	<0.178 U	NA
Polychlorinated Biphenyl																						
PCB-1016 (Aroclor 1016)	12674-11-2	NS	mg/kg	<0.0174 U	<0.0173 UJ	<0.0176 U	NA	<0.0171 U	NA	<0.0177 U	NA	<0.0177 U	NA	NA	<0.021 U	NA	<0.0423 U	NA	NA	<0.0207 U	<0.0512 U	NA
PCB-1221 (Aroclor 1221)	11104-28-2	NS	mg/kg	<0.0174 U	<0.0173 UJ	<0.0176 U	NA	<0.0171 U	NA	<0.0177 U	NA	<0.0177 U	NA	NA	<0.021 U	NA	<0.0423 U	NA	NA	<0.0207 U	<0.0512 U	NA
PCB-1232 (Aroclor 1232)	11141-16-5	NS	mg/kg	<0.0174 U	<0.0173 UJ	<0.0176 U	NA	<0.0171 U	NA	<0.0177 U	NA	<0.0177 U	NA	NA	<0.021 U	NA	<0.0423 U	NA	NA	<0.0207 U	<0.0512 U	NA
PCB-1242 (Aroclor 1242)	53469-21-9	NS	mg/kg	<0.0174 U	<0.0173 UJ	<0.0176 U	NA	<0.0171 U	NA	<0.0177 U	NA	<0.0177 U	NA	NA	<0.021 U	NA	<0.0423 U	NA	NA	<0.0207 U	<0.0512 U	NA
PCB-1248 (Aroclor 1248)	12672-29-6	NS	mg/kg	<0.0174 U	<0.0173 UJ	<0.0176 U	NA	<0.0171 U	NA	<0.0177 U	NA	<0.0177 U	NA	NA	<0.021 U	NA	<0.0423 U	NA	NA	<0.0207 U	<0.0512 U	NA
PCB-1254 (Aroclor 1254)	11097-69-1	NS	mg/kg	<0.0174 U	<0.0173 UJ	<0.0176 U	NA	<0.0171 U	NA	<0.0177 U	NA	<0.0177 U	NA	NA	<0.021 U	NA	<0.0423 U	NA	NA	<0.0207 U	<0.0512 U	NA
PCB-1260 (Aroclor 1260)	11096-82-5	NS	mg/kg	<0.0174 U	<0.0173 UJ	<0.0176 U	NA	<0.0171 U	NA	<0.0177 U	NA	<0.0177 U	NA	NA	<0.021 U	NA	<0.0423 U	NA	NA	<0.0207 U	<0.0512 U	NA
PCB-1262 (Aroclor 1262)	37324-23-5	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0512 U	NA
PCB-1268 (Aroclor 1268)	11100-14-4	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0512 U	NA
Total PCBs	1336-36-3	0.1	mg/kg	<0.0174 U	<0.0173 UJ	<0.0176 U	NA	<0.0171 U	NA	<0.0177 U	NA	<0.0177 U	NA	NA	<0.021 U	NA	<0.0423 U	NA	NA	<0.0207 U	<0.0512 U	NA
Metals																						
Aluminum	7429-90-5	NS	mg/kg	601	651	3,010	NA	5,580	NA	2,060	NA	2,060	NA	NA	1,300	NA	752	NA	NA	1,470	2,160	NA
Antimony	7440-36-0	NS	mg/kg	<2.19 U	<2.17 U	<2.22 U	NA	<2.16 U	NA	<2.22 U	NA	<2.23 U	NA	NA	<2.64 U	NA	<2.65 U	NA	NA	<2.65 U	<4.22 U	NA
Arsenic	7440-38-2	13	mg/kg	<1.31 U	<1.3 U	2.76	NA	2.37	NA	2.23	NA	2.88	NA	NA	<1.58 U	NA	<1.59 U	NA	NA	<1.59 U	3.03	NA
Barium	7440-39-3	**350**	mg/kg	3.26	4.04	53.4	NA	70.2	NA	95.9	NA	205	NA	NA	68.2	NA	7.23	NA	NA	17.3	73.9	NA
Beryllium	7440-41-7	7.2	mg/kg	<0.044 U	<0.044 U	<0.045 U	NA	<0.044 U	NA	<0.045 U	NA	<0.045 U	NA	NA	<0.053 U	NA	<0.054 U	NA	NA	<0.053 U	0.145 J	NA
Cadmium	7440-43-9	2.5	mg/kg	<0.263 U	<0.261 U	<0.267 U	NA	<0.26 U	NA	<0.267 U	NA	0.766	NA	NA	<0.317 U	NA	<0.319 U	NA	NA	<0.318 U	0.178 J	NA
Calcium	7440-70-2	NS	mg/kg	333	415	4,610	NA	4,360	NA	2,330	NA	6,550	NA	NA	12,200	NA	747	NA	NA	4,230 J	32,900	NA
Chromium, Hexavalent	18540-29-9	**1**	mg/kg	<0.525 U	<0.521 U	<0.533 U	NA	<0.519 U	NA	0.479 J	<0.516 U	0.647	<0.521 U	NA	<0.633 U	<0.618 U	<0.637 U	<0.594 U	NA	<0.636 U	0.409 J	NA
Chromium, Total	7440-47-3	NS	mg/kg	3.12	3.83	7.94	NA	13.7	NA	6.75	NA	7.38	NA	NA	5.59	NA	4.71	NA	NA	4.26	7.6	NA
Chromium, Trivalent	16065-83-1	30	mg/kg	3.12	3.83	7.94	NA	13.7	NA	6.27	NA	6.73	NA	NA	5.59	NA	4.71	NA	NA	4.26	7.19 J	NA
Cobalt	7440-48-4	NS	mg/kg	0.482	0.539	2.14	NA	8.62	NA	1.72	NA	1.98	NA	NA	1.3	NA	0.69	NA	NA	1.21	2.31	NA
Copper	7440-50-8	50	mg/kg	<1.75 U	<1.74 U	14.8	NA	25.7	NA	15.6	NA	46.2	NA	NA	11.9	NA	<2.12 U	NA	NA	2.86 J	17.9	NA
Cyanide	57-12-5	27	mg/kg	<0.525 U	<0.521 U	<0.533 U	NA	0.742	NA	<0.533 U	NA	<0.534 U	NA	NA	<0.633 U	NA	<0.637 U	NA	NA	<0.636 U	0.31 J	NA
Iron	7439-89-6	NS	mg/kg	951 J	1,230	4,170	NA	11,400	NA	6,880	NA	5,710	NA	NA	2,920	NA	1,380	NA	NA	2,600 J	4,850	NA
Lead	7439-92-1	**63**	mg/kg	1.66	2.27	**101**	1.94	**64.5**	1.55	**168**	5.16	**426**	5.95	NA	**124**	2.29	8.66	NA	NA	25 J	**142**	5.65
Magnesium	7439-95-4	NS	mg/kg	216	218	2,150	NA	2,860	NA	1,010	NA	2,110	NA	NA	5,920	NA	334 J	NA	NA	835	8,320	NA
Manganese	7439-96-5	1600	mg/kg	24.8	34.6	88.7	NA	120	NA	78.2	NA	92.9	NA	NA	52	NA	25	NA	NA	26.2	110	NA
Mercury	7439-97-6	**0.18**	mg/kg	<0.0315 U	<0.0313 U	0.0998	NA	0.0932	NA	0.115	NA	0.0756	NA	NA	0.0471	NA	<0.0382 U	NA	NA	0.0849	0.112	NA
Nickel	7440-02-0	30	mg/kg	0.928	<0.866 U	6.97	NA	18.5	NA	4.65	NA	6.77	NA	NA	4.4	NA	1.24	NA	NA	6.1	6.38	NA
Potassium	7440-09-7	NS	mg/kg	123	128	395	NA	1,710	NA	276	NA	337	NA	NA	232	NA	152	NA	NA	243 J	341	NA
Selenium	7782-49-2	3.9	mg/kg	<2.19 U	<2.17 U	<2.22 U	NA	<2.16 U	NA	<2.22 U	NA	<2.23 U	NA	NA	<2.64 U	NA	<2.65 U	NA	NA	<2.65 U	<1.69 U	NA
Silver	7440-22-4	2	mg/kg	<0.441 U	<0.438 U	<0.448 U	NA	<0.436 U	NA	<0.448 U	NA	<0.449 U	NA	NA	<0.532 U	NA	<0.535 U	NA	NA	<0.534 U	<0.422 U	NA
Sodium	7440-23-5	NS	mg/kg	<43.8 U	<43.5 U	66.1	NA	163	NA	<44.4 U	NA	78.5	NA	NA	125	NA	90.6	NA	NA	59.9	<169 U	NA
Thallium	7440-28-0	NS	mg/kg	<1.75 U	<1.74 U	<1.78 U	NA	<1.73 U	NA	<1.78 U	NA	<1.78 U	NA	NA	<2.12 U	NA	<2.13 U	NA	NA	<2.12 U	<1.69 U	NA
Vanadium	7440-62-2	NS	mg/kg	2.79	3.79	10.8	NA	22.6	NA	7.78	NA	10.2	NA	NA	11.8	NA	4.44	NA	NA	4.05 J	10.8	NA
Zinc	7440-66-6	**109**	mg/kg	8.38	6.37	87.9	NA	79.4	NA	**121**	13.2	**356**	16.1	NA	92.4	NA	36.5	NA	NA	20.1 J	**145**	7.27
General Chemistry																						
Solids, Percent	SOLID	NS	Percent	95.2	95.9	93.8	80.9	96.3	88.7	93.8	97	93.6	95.9	96.3	78.9	80.9	78.5	84.2	76.3	78.6	92.8	96.5

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP42	EP42	EP42	EP42	EP43	EP44	EP45	EP46	EP47	EP48	EP49	EP50	EP50	EP51	EP52	EP53	EP54	EP54
			Sample Name	EP42_EL6	EP42_EL4	EP42_EL3	EP42_EL2	EP43_EL3	EP44_EL6	EP45_EL6.5	EP46_EL4	EP47_EL4	EP48_EL4	EP49_EL3	EP50_EL-6	DUP03_061325	EP51_EL-6	EP52_EL-6	EP53_EL-6	EP54_EL4	EP54_EL3
			Sample Date	04/16/2025	04/28/2025	05/02/2025	05/13/2025	04/22/2025	05/13/2025	05/13/2025	05/06/2025	04/28/2025	04/28/2025	04/15/2025	06/13/2025	06/13/2025	06/13/2025	06/16/2025	06/16/2025	05/06/2025	05/23/2025
			Sample Elevation	6	4	3	2	3	6	6.5	4	4	4	3	-6	4	-6	-6	-6	4	9
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																					
1,1,1,2-Tetrachloroethane	630-20-6	NS	mg/kg	<0.00059 U	NA	NA	NA	<0.00055 U	<0.00071 U	<0.00057 U	<0.00059 U	<0.00051 U	<0.00052 U	<0.00063 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0012 U	NA
1,1,1-Trichloroethane	71-55-6	0.68	mg/kg	<0.00059 U	NA	NA	NA	<0.00055 U	<0.00071 U	<0.00057 U	<0.00059 U	<0.00051 U	<0.00052 U	<0.00063 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0012 U	NA
1,1,2,2-Tetrachloroethane	79-34-5	NS	mg/kg	<0.00059 U	NA	NA	NA	<0.00055 U	<0.00071 U	<0.00057 U	<0.00059 U	<0.00051 U	<0.00052 U	<0.00063 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0012 U	NA
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	NA	NA
1,1,2-Trichloroethane	79-00-5	NS	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
1,1-Dichloroethane	75-34-3	0.27	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
1,1-Dichloroethene	75-35-4	0.33	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
1,1-Dichloropropene	563-58-6	NS	mg/kg	<0.00059 U	NA	NA	NA	<0.00055 U	<0.00071 U	<0.00057 U	<0.00059 U	<0.00051 U	<0.00052 U	<0.00063 U	NA	NA	NA	NA	NA	<0.0012 U	NA
1,2,3-Trichlorobenzene	87-61-6	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0049 U	NA
1,2,3-Trichloropropane	96-18-4	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0049 U	NA
1,2,4,5-Tetramethylbenzene	95-93-2	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	NA	NA	NA	NA	NA	<0.0049 U	NA
1,2,4-Trichlorobenzene	120-82-1	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0049 U	NA
1,2,4-Trimethylbenzene	95-63-6	3.6	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0049 U	NA
1,2-Dibromo-3-Chloropropane	96-12-8	NS	mg/kg	<0.0036 U	NA	NA	NA	<0.0033 U	<0.0043 U	<0.0034 U	<0.0035 U	<0.0031 U	<0.0031 U	<0.0038 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0074 U	NA
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
1,2-Dichlorobenzene	95-50-1	1.1	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0049 U	NA
1,2-Dichloroethane	107-06-2	0.02	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
1,2-Dichloropropane	78-87-5	NS	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 UJ	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0049 U	NA
1,3-Dichlorobenzene	541-73-1	2.4	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0049 U	NA
1,3-Dichloropropane	142-28-9	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	NA	NA	NA	NA	NA	<0.0049 U	NA
1,4-Dichlorobenzene	106-46-7	1.8	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0049 U	NA
1,4-Diethyl Benzene	105-05-5	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	NA	NA	NA	NA	NA	<0.0049 U	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	mg/kg	<0.095 U	NA	NA	NA	<0.089 U	<0.11 U	<0.091 U	<0.094 U	<0.082 UJ	<0.083 UJ	<0.1 U	NA	NA	NA	NA	NA	<0.2 U	NA
2,2-Dichloropropane	594-20-7	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	NA	NA	NA	NA	NA	<0.0049 U	NA
2-Chlorotoluene	95-49-8	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	NA	NA	NA	NA	NA	<0.0049 U	NA
2-Hexanone (MBK)	591-78-6	NS	mg/kg	<0.012 U	NA	NA	NA	<0.011 U	<0.014 U	<0.011 U	<0.012 U	<0.01 UJ	<0.01 UJ	<0.012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.024 U	NA
4-Chlorotoluene	106-43-4	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	NA	NA	NA	NA	NA	<0.0049 U	NA
4-Ethyltoluene	622-96-8	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	NA	NA	NA	NA	NA	<0.0049 U	NA
Acetone	67-64-1	**0.05**	mg/kg	<0.012 U	NA	NA	NA	<0.011 U	<0.014 U	0.0061 J	<0.012 U	<0.01 U	<0.01 U	<0.012 U	0.0066 J	0.0078 J	0.0068 J	0.013	0.014	**0.051**	<0.011 U
Acrolein	107-02-8	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.013 U	<0.012 U	<0.011 U	<0.011 U	<0.0095 U	NA	NA
Acrylonitrile	107-13-1	NS	mg/kg	<0.0047 U	NA	NA	NA	<0.0044 U	<0.0057 U	<0.0045 U	<0.0047 U	<0.0041 U	<0.0041 U	<0.005 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0098 U	NA
Benzene	71-43-2	0.06	mg/kg	<0.00059 U	NA	NA	NA	<0.00055 U	<0.00071 U	<0.00057 U	<0.00059 U	<0.00051 U	<0.00052 U	<0.00063 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0012 U	NA
Bromobenzene	108-86-1	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	NA	NA	NA	NA	NA	<0.0049 U	NA
Bromochloromethane	74-97-5	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0049 U	NA
Bromodichloromethane	75-27-4	NS	mg/kg	<0.00059 U	NA	NA	NA	<0.00055 U	<0.00071 U	<0.00057 U	<0.00059 U	<0.00051 U	<0.00052 U	<0.00063 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0012 U	NA
Bromoform	75-25-2	NS	mg/kg	<0.0047 U	NA	NA	NA	<0.0044 U	<0.0057 U	<0.0045 U	<0.0047 U	<0.0041 U	<0.0041 U	<0.005 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0098 U	NA
Bromomethane	74-83-9	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0049 U	NA
Carbon Disulfide	75-15-0	NS	mg/kg	<0.012 U	NA	NA	NA	<0.011 U	<0.014 U	<0.011 U	<0.012 U	<0.01 U	<0.01 U	<0.012 U	<0.0063 U	0.0035 J	0.0052 J	0.0054	0.0063	<0.024 U	NA
Carbon Tetrachloride	56-23-5	0.76	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
Chlorobenzene	108-90-7	1.1	mg/kg	<0.00059 U	NA	NA	NA	<0.00055 U	<0.00071 U	<0.00057 U	<0.00059 U	<0.00051 U	<0.00052 U	<0.00063 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0012 U	NA
Chloroethane	75-00-3	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0049 U	NA
Chloroform	67-66-3	0.37	mg/kg	<0.0018 U	NA	NA	NA	<0.0017 U	<0.0021 U	<0.0017 U	<0.0018 U	<0.0015 U	<0.0016 U	<0.0019 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0037 U	NA
Chloromethane	74-87-3	NS	mg/kg	<0.0047 U	NA	NA	NA	<0.0044 U	<0.0057 U	<0.0045 U	<0.0047 U	<0.0041 U	<0.0041 U	<0.005 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0098 U	NA
Cis-1,2-Dichloroethene	156-59-2	0.25	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
Cis-1,3-Dichloropropene	10061-01-5	NS	mg/kg	<0.00059 U	NA	NA	NA	<0.00055 U	<0.00071 U	<0.00057 U	<0.00059 U	<0.00051 U	<0.00052 U	<0.00063 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0012 U	NA
Cyclohexane	110-82-7	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	NA	NA
Cymene	99-87-6	NS	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
Dibromochloromethane	124-48-1	NS	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
Dibromomethane	74-95-3	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0049 U	NA
Dichlorodifluoromethane	75-71-8	NS	mg/kg	<0.012 U	NA	NA	NA	<0.011 U	<0.014 U	<0.011 U	<0.012 U	<0.01 U	<0.01 U	<0.012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.024 U	NA
Diethyl Ether (Ethyl Ether)	60-29-7	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	NA	NA	NA	NA	NA	<0.0049 U	NA
Ethylbenzene	100-41-4	1	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
Hexachlorobutadiene	87-68-3	NS	mg/kg	<0.0047 U	NA	NA	NA	<0.0044 U	<0.0057 U	<0.0045 U	<0.0047 U	<0.0041 U	<0.0041 U	<0.005 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0098 U	NA
Isopropylbenzene (Cumene)	98-82-8	NS	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
M,P-Xylene	179601-23-1	NS	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	<0.013 U	<0.012 U	<0.011 U	<0.011 U	<0.0095 U	<0.0049 U	NA
Methyl Acetate	79-20-9	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	NA	NA
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	mg/kg	<0.012 UJ	NA	NA	NA	<0.011 U	<0.014 U	<0.011 U	<0.012 U	<0.01 U	<0.01 U	<0.012 UJ	<0.0063 U	<0.0061 U	<0.0056 U	0.0029 J	0.0026 J	<0.024 U	NA
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	mg/kg	<0.012 U	NA	NA	NA	<0.011 U	<0.014 U	<0.011 U	<0.012 U	<0.01 U	<0.01 U	<0.012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.024 U	NA
Methylcyclohexane	108-87-2	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	NA	NA
Methylene Chloride	75-09-2	0.05	mg/kg	<0.0059 U	NA	NA	NA	<0.0055 U	<0.0071 U	<0.0057 U	<0.0059 U	<0.0051 U	<0.0052 U	<0.0063 U	<0.013 U	<0.012 U	<0.011 U	<0.011 U	<0.0095 U	<0.012 U	NA
Naphthalene	91-20-3	12	mg/kg	<0.0047 U	NA	NA	NA	<0.0044 U	<0.0057 U	<0.0045 U	<0.0047 U	<0.0041 U	<0.0041 U	<0.005 U	NA	NA	NA	NA	NA	<0.0098 U	NA
n-Butylbenzene	104-51-8	12	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
n-Propylbenzene	103-65-1	3.9	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
o-Cymene (O-Isopropyltoluene)	527-84-4	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
Sec-Butylbenzene	135-98-8	11	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
Styrene	100-42-5	NS	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
T-Butylbenzene	98-06-6	5.9	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0049 U	NA
Tert-Butyl Alcohol	75-65-0	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.031 UJ	<0.031 U	<0.028 UJ	<0.026 UJ	<0.024 UJ	NA	NA
Tert-Butyl Methyl Ether (MTBE)	1634-04-4	0.93	mg/kg	<0.0024 U	NA	NA	NA	<0.0022 U	<0.0028 U	<0.0023 U	<0.0024 U	<0.002 U	<0.0021 U	<0.0025 U	<0.0063 UJ	<0.0061 U	<0.0056 UJ	<0.0053 UJ	<0.0047 UJ	<0.0049 U	NA
Tetrachloroethene (PCE)	127-18-4	1.3	mg/kg	<0.00059 U	NA	NA	NA	<0.00055 U	<0.00071 U	<0.00057 U	<0.00059 U	<0.00051 U	<0.00052 U	<0.00063 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0012 U	NA
Tetrahydrofuran	109-99-9	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	108-88-3	0.7	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	NA	NA	NA	NA	NA	<0.0024 U	NA
Total Xylenes	1330-20-7	0.26	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.019 U	<0.018 U	<0.017 U	<0.016 U	<0.014 U	<0.0024 U	NA
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	NS	mg/kg	<0.00059 U	NA	NA	NA	<0.00055 U	<0.00071 U	<0.00057 U	<0.00059 U	<0.00051 U	<0.00052 U	<0.00063 U	NA	NA	NA	NA	NA	<0.0012 U	NA
Trans-1,2-Dichloroethene	156-60-5	0.19	mg/kg	<0.0018 U	NA	NA	NA	<0.0017 U	<0.0021 U	<0.0017 U	<0.0018 U	<0.0015 U	<0.0016 U	<0.0019 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0037 U	NA
Trans-1,3-Dichloropropene	10061-02-6	NS	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 UJ	<0.0047 UJ	<0.0024 U	NA
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	mg/kg	<0.0059 U	NA	NA	NA	<0.0055 U	<0.0071 U	<0.0057 U	<0.0059 U	<0.0051 U	<0.0052 U	<0.0063 U	NA	NA	NA	NA	NA	<0.012 U	NA
Trichloroethene (TCE)	79-01-6	0.47	mg/kg	<0.00059 U	NA	NA	NA	<0.00055 U	<0.00071 U	<0.00057 U	<0.00059 U	<0.00051 U	<0.00052 U	<0.00063 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0012 U	NA
Trichlorofluoromethane	75-69-4	NS	mg/kg	<0.0047 U	NA	NA	NA	<0.0044 U	<0.0057 U	<0.0045 U	<0.0047 U	<0.0041 U	<0.0041 U	<0.005 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0098 U	NA
Vinyl Acetate	108-05-4	NS	mg/kg	<0.012 UJ	NA	NA	NA	<0.011 U	<0.014 U	<0.011 U	<0.012 U	<0.01 U	<0.01 U	<0.012 UJ	NA	NA	NA	NA	NA	<0.024 U	NA
Vinyl Chloride	75-01-4	0.02	mg/kg	<0.0012 U	NA	NA	NA	<0.0011 U	<0.0014 U	<0.0011 U	<0.0012 U	<0.001 U	<0.001 U	<0.0012 U	<0.0063 U	<0.0061 U	<0.0056 U	<0.0053 U	<0.0047 U	<0.0024 U	NA

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP42	EP42	EP42	EP42	EP43	EP44	EP45	EP46	EP47	EP48	EP49	EP50	EP50	EP51	EP52	EP53	EP54	EP54
			Sample Name	EP42_EL6	EP42_EL4	EP42_EL3	EP42_EL2	EP43_EL3	EP44_EL6	EP45_EL6.5	EP46_EL4	EP47_EL4	EP48_EL4	EP49_EL3	EP50_EL-6	DUP03_061325	EP51_EL-6	EP52_EL-6	EP53_EL-6	EP54_EL4	EP54_EL3
			Sample Date	04/16/2025	04/28/2025	05/02/2025	05/13/2025	04/22/2025	05/13/2025	05/13/2025	05/06/2025	04/28/2025	04/28/2025	04/15/2025	06/13/2025	06/13/2025	06/13/2025	06/16/2025	06/16/2025	05/06/2025	05/23/2025
			Sample Elevation	6	4	3	2	3	6	6.5	4	4	4	3	-6	4	-6	-6	-6	4	9
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																					
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.191 U	<0.188 U	<0.206 U	<0.194 U	<0.217 U	<0.18 U	NA
1,2,4-Trichlorobenzene	120-82-1	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	NA	NA	NA	NA	NA	<0.18 U	NA
1,2-Dichlorobenzene	95-50-1	1.1	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	NA	NA	NA	NA	NA	<0.18 U	NA
1,2-Diphenylhydrazine	122-66-7	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	NA	NA
1,3-Dichlorobenzene	541-73-1	2.4	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	NA	NA	NA	NA	NA	<0.18 U	NA
1,4-Dichlorobenzene	106-46-7	1.8	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	NA	NA	NA	NA	NA	<0.18 U	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	mg/kg	<0.027 U	NA	NA	NA	<0.026 U	<0.033 U	<0.026 U	<0.026 U	<0.026 UJ	<0.026 UJ	<0.026 U	<0.0185 U	<0.0198 U	<0.0189 U	<0.0198 U	<0.0183 U	<0.026 U	NA
2,3,4,6-Tetrachlorophenol	58-90-2	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.191 U	<0.188 U	<0.206 U	<0.194 U	<0.217 U	NA	NA
2,4,5-Trichlorophenol	95-95-4	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
2,4,6-Trichlorophenol	88-06-2	NS	mg/kg	<0.11 U	NA	NA	NA	<0.1 U	<0.13 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.1 U	NA
2,4-Dichlorophenol	120-83-2	NS	mg/kg	<0.16 U	NA	NA	NA	<0.16 U	<0.2 U	<0.15 U	<0.16 U	<0.15 U	<0.15 U	<0.15 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.16 U	NA
2,4-Dimethylphenol	105-67-9	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
2,4-Dinitrophenol	51-28-5	NS	mg/kg	<0.87 U	NA	NA	NA	<0.83 U	<1 U	<0.82 U	<0.83 U	<0.82 U	<0.82 U	<0.82 U	<0.191 U	<0.188 U	<0.206 U	<0.194 U	<0.217 U	<0.85 U	NA
2,4-Dinitrotoluene	121-14-2	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
2,6-Dinitrotoluene	606-20-2	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
2-Chloronaphthalene	91-58-7	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
2-Chlorophenol	95-57-8	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
2-Methylnaphthalene	91-57-6	NS	mg/kg	0.025 J	NA	NA	NA	<0.21 U	<0.26 U	<0.2 U	<0.21 U	<0.2 U	<0.2 U	<0.2 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	0.053 J	NA
2-Methylphenol (o-Cresol)	95-48-7	0.33	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
2-Nitroaniline	88-74-4	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.191 U	<0.188 U	<0.206 U	<0.194 U	<0.217 U	<0.18 U	NA
2-Nitrophenol	88-75-5	NS	mg/kg	<0.39 U	NA	NA	NA	<0.37 U	<0.47 U	<0.37 U	<0.37 U	<0.37 U	<0.37 U	<0.37 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.38 U	NA
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	mg/kg	<0.26 U	NA	NA	NA	<0.25 U	<0.31 U	<0.25 U	<0.25 U	<0.25 U	<0.25 U	<0.24 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.25 U	NA
3,3'-Dichlorobenzidine	91-94-1	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
3-Nitroaniline	99-09-2	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.191 U	<0.188 U	<0.206 U	<0.194 U	<0.217 U	<0.18 U	NA
4,6-Dinitro-2-Methylphenol	534-52-1	NS	mg/kg	<0.47 U	NA	NA	NA	<0.45 U	<0.57 U	<0.44 U	<0.45 U	<0.44 U	<0.44 U	<0.44 U	<0.191 U	<0.188 U	<0.206 U	<0.194 U	<0.217 U	<0.46 U	NA
4-Bromophenyl Phenyl Ether	101-55-3	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
4-Chloro-3-Methylphenol	59-50-7	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
4-Chloroaniline	106-47-8	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 UJ	<0.17 UJ	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
4-Nitroaniline	100-01-6	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.191 U	<0.188 U	<0.206 U	<0.194 U	<0.217 U	<0.18 U	NA
4-Nitrophenol	100-02-7	NS	mg/kg	<0.25 U	NA	NA	NA	<0.24 U	<0.3 U	<0.24 U	<0.24 U	<0.24 U	<0.24 U	<0.24 U	<0.191 U	<0.188 U	<0.206 U	<0.194 U	<0.217 U	<0.25 U	NA
Acenaphthene	83-32-9	20	mg/kg	0.1 J	NA	NA	NA	<0.14 U	<0.17 U	<0.14 U	<0.14 U	<0.14 U	<0.14 U	<0.14 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	0.13 J	NA
Acenaphthylene	208-96-8	100	mg/kg	0.16	NA	NA	NA	<0.14 U	<0.17 U	<0.14 U	<0.14 U	<0.14 U	<0.14 U	<0.14 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	0.12 J	NA
Acetophenone	98-86-2	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
Aniline (Phenylamine, Aminobenzene)	62-53-3	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.382 U	<0.378 U	<0.414 U	<0.39 U	<0.435 U	NA	NA
Anthracene	120-12-7	100	mg/kg	0.43	NA	NA	NA	<0.1 U	<0.13 U	<0.1 U	<0.1 U	<0.1 U	0.034 J	<0.1 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	0.35	NA
Atrazine	1912-24-9	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	NA	NA
Benzaldehyde	100-52-7	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	NA	NA
Benzidine	92-87-5	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.382 U	<0.378 U	<0.414 U	<0.39 U	<0.435 U	NA	NA
Benzo(a)anthracene	56-55-3	**1**	mg/kg	**1.4**	**2.1**	0.12 J	NA	<0.1 U	0.1 J	<0.1 U	<0.1 U	<0.1 U	0.12	<0.1 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	**1.2**	<0.0935 U
Benzo(a)pyrene	50-32-8	**1**	mg/kg	**1.3**	**2.5**	0.13 J	NA	<0.14 U	0.12 J	<0.14 U	<0.14 U	<0.14 U	0.14	<0.14 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	0.98	NA
Benzo(b)fluoranthene	205-99-2	**1**	mg/kg	**1.6**	**2.7**	0.15	NA	<0.1 U	0.15	<0.1 U	<0.1 U	<0.1 U	0.17	<0.1 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	**1.4**	<0.0935 U
Benzo(g,h,i)Perylene	191-24-2	100	mg/kg	0.8	NA	NA	NA	<0.14 U	0.081 J	<0.14 U	<0.14 U	<0.14 U	0.08 J	<0.14 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	0.73	NA
Benzo(k)fluoranthene	207-08-9	**0.8**	mg/kg	0.52	NA	NA	NA	<0.1 U	0.048 J	<0.1 U	<0.1 U	<0.1 U	0.048 J	<0.1 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	0.48	NA
Benzoic Acid	65-85-0	NS	mg/kg	<0.58 U	NA	NA	NA	<0.56 U	<0.71 UJ	<0.55 UJ	<0.56 U	<0.55 U	<0.56 U	<0.55 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.57 U	NA
Benzyl Alcohol	100-51-6	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
Benzyl Butyl Phthalate	85-68-7	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
Biphenyl (Diphenyl)	92-52-4	NS	mg/kg	<0.41 U	NA	NA	NA	<0.39 U	<0.5 U	<0.39 U	<0.39 U	<0.39 U	<0.39 U	<0.39 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	0.024 J	NA
Bis(2-chloroethoxy) methane	111-91-1	NS	mg/kg	<0.19 U	NA	NA	NA	<0.19 U	<0.24 U	<0.18 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.19 U	NA
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	mg/kg	<0.16 U	NA	NA	NA	<0.16 U	<0.2 U	<0.15 U	<0.16 U	<0.15 U	<0.15 U	<0.15 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.16 U	NA
Bis(2-chloroisopropyl) ether	108-60-1	NS	mg/kg	<0.22 U	NA	NA	NA	<0.21 U	<0.26 U	<0.2 U	<0.21 U	<0.2 U	<0.2 U	<0.2 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.21 U	NA
Bis(2-ethylhexyl) phthalate	117-81-7	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
Caprolactam	105-60-2	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.191 U	<0.188 U	<0.206 U	<0.194 U	<0.217 U	NA	NA
Carbazole	86-74-8	NS	mg/kg	0.14 J	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	0.16 J	NA
Chrysene	218-01-9	**1**	mg/kg	**1.4**	**2.2**	0.12 J	NA	<0.1 U	0.11 J	<0.1 U	<0.1 U	<0.1 U	0.12	<0.1 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	**1.2**	<0.0935 U
Dibenz(a,h)anthracene	53-70-3	**0.33**	mg/kg	0.18	NA	NA	NA	<0.1 U	<0.13 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	0.19	NA
Dibenzofuran	132-64-9	7	mg/kg	0.06 J	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	0.13 J	NA
Dibutyl phthalate	84-74-2	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
Diethyl phthalate	84-66-2	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
Dimethyl phthalate	131-11-3	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
Dioctyl phthalate	117-84-0	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
Diphenylamine	122-39-4	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.191 U	<0.188 U	<0.206 U	<0.194 U	<0.217 U	NA	NA
Fluoranthene	206-44-0	100	mg/kg	3.3	NA	NA	NA	<0.1 U	0.25	0.024 J	<0.1 U	<0.1 U	0.23	<0.1 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	2.2	NA
Fluorene	86-73-7	30	mg/kg	0.11 J	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	0.1 J	NA
Hexachlorobenzene	118-74-1	0.33	mg/kg	<0.11 U	NA	NA	NA	<0.1 U	<0.13 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.1 U	NA
Hexachlorobutadiene	87-68-3	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
Hexachlorocyclopentadiene	77-47-4	NS	mg/kg	<0.52 U	NA	NA	NA	<0.49 U	<0.62 U	<0.49 U	<0.49 U	<0.49 U	<0.49 U	<0.49 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.5 U	NA
Hexachloroethane	67-72-1	NS	mg/kg	<0.14 U	NA	NA	NA	<0.14 U	<0.17 U	<0.14 U	<0.14 U	<0.14 U	<0.14 U	<0.14 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.14 U	NA
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	mg/kg	**0.8**	**1.2**	0.055 J	NA	<0.14 U	0.081 J	<0.14 U	<0.14 U	<0.14 U	0.076 J	<0.14 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	**0.75**	<0.0935 U
Isophorone	78-59-1	NS	mg/kg	<0.16 U	NA	NA	NA	<0.16 U	<0.2 U	<0.15 U	<0.16 U	<0.15 U	<0.15 U	<0.15 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.16 U	NA
Naphthalene	91-20-3	12	mg/kg	0.057 J	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	0.1 J	NA
Nitrobenzene	98-95-3	NS	mg/kg	<0.16 U	NA	NA	NA	<0.16 U	<0.2 U	<0.15 U	<0.16 U	<0.15 U	<0.15 U	<0.15 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.16 U	NA
n-Nitrosodimethylamine	62-75-9	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	NA	NA
n-Nitrosodi-N-Propylamine	621-64-7	NS	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
n-Nitrosodiphenylamine	86-30-6	NS	mg/kg	<0.14 U	NA	NA	NA	<0.14 U	<0.17 U	<0.14 U	<0.14 U	<0.14 U	<0.14 U	<0.14 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.14 U	NA
Pentachlorophenol	87-86-5	0.8	mg/kg	<0.14 U	NA	NA	NA	<0.14 U	<0.17 U	<0.14 U	<0.14 U	<0.14 U	<0.14 U	<0.14 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.14 U	NA
Phenanthrene	85-01-8	100	mg/kg	2.1	NA	NA	NA	<0.1 U	0.13	<0.1 U	<0.1 U	<0.1 U	0.18	<0.1 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	2	NA
Phenol	108-95-2	0.33	mg/kg	<0.18 U	NA	NA	NA	<0.17 U	<0.22 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.17 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	<0.18 U	NA
Pyrene	129-00-0	100	mg/kg	2.9	NA	NA	NA	<0.1 U	0.22	0.022 J	<0.1 U	<0.1 U	0.23	<0.1 U	<0.0954 U	<0.0943 U	<0.103 U	<0.0973 U	<0.109 U	2	NA
Pyridine	110-86-1	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.382 U	<0.378 U	<0.414 U	<0.39 U	<0.435 U	NA	NA

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP42	EP42	EP42	EP42	EP43	EP44	EP45	EP46	EP47	EP48	EP49	EP50	EP50	EP51	EP52	EP53	EP54	EP54
			Sample Name	EP42_EL6	EP42_EL4	EP42_EL3	EP42_EL2	EP43_EL3	EP44_EL6	EP45_EL6.5	EP46_EL4	EP47_EL4	EP48_EL4	EP49_EL3	EP50_EL-6	DUP03_061325	EP51_EL-6	EP52_EL-6	EP53_EL-6	EP54_EL4	EP54_EL3
			Sample Date	04/16/2025	04/28/2025	05/02/2025	05/13/2025	04/22/2025	05/13/2025	05/13/2025	05/06/2025	04/28/2025	04/28/2025	04/15/2025	06/13/2025	06/13/2025	06/13/2025	06/16/2025	06/16/2025	05/06/2025	05/23/2025
			Sample Elevation	6	4	3	2	3	6	6.5	4	4	4	3	-6	4	-6	-6	-6	4	9
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																					
4,4'-DDD	72-54-8	**0.0033**	mg/kg	<0.00169 U	NA	NA	NA	<0.00166 U	<0.00204 U	<0.00168 U	<0.00168 U	<0.00164 U	<0.00168 U	<0.00164 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	0.000643 J	NA
4,4'-DDE	72-55-9	**0.0033**	mg/kg	0.00205 J	NA	NA	NA	<0.00166 U	<0.00204 U	<0.00168 U	<0.00168 U	<0.00164 U	<0.00168 U	<0.00164 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	0.00124 J	NA
4,4'-DDT	50-29-3	**0.0033**	mg/kg	**0.00672**	<0.0018 U	NA	NA	<0.00166 U	<0.00204 U	<0.00168 U	<0.00168 U	<0.00164 U	0.00235	<0.00164 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	**0.00391 J**	<0.00182 U
Aldrin	309-00-2	0.005	mg/kg	<0.00169 U	NA	NA	NA	<0.00166 U	<0.00204 U	<0.00168 U	<0.00168 U	<0.00164 U	<0.00168 U	<0.00164 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	<0.00167 U	NA
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	mg/kg	<0.000706 U	NA	NA	NA	<0.000694 U	<0.000851 U	<0.000698 U	<0.000701 U	<0.000686 U	<0.000699 U	<0.000686 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	<0.000696 U	NA
Alpha Chlordane	5103-71-9	0.094	mg/kg	<0.00212 U	NA	NA	NA	<0.00208 U	<0.00255 U	<0.00209 U	<0.0021 U	<0.00206 U	<0.0021 U	<0.00206 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	0.000626 J	NA
Alpha Endosulfan	959-98-8	2.4	mg/kg	<0.00169 U	NA	NA	NA	<0.00166 U	<0.00204 U	<0.00168 U	<0.00168 U	<0.00164 U	<0.00168 U	<0.00164 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	<0.00167 U	NA
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	mg/kg	<0.00169 U	NA	NA	NA	<0.00166 U	<0.00204 U	<0.00168 U	<0.00168 U	<0.00164 U	<0.00168 U	<0.00164 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	<0.00167 U	NA
Beta Endosulfan	33213-65-9	2.4	mg/kg	<0.00169 U	NA	NA	NA	<0.00166 U	<0.00204 U	<0.00168 U	<0.00168 U	<0.00164 U	<0.00168 U	<0.00164 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	<0.00167 U	NA
Chlordane (alpha and gamma)	57-74-9	NS	mg/kg	<0.0141 U	NA	NA	NA	<0.0139 U	<0.017 U	<0.014 U	<0.014 U	<0.0137 U	<0.014 U	<0.0137 U	<0.0376 U	<0.0368 U	<0.0409 U	<0.039 U	<0.0433 U	<0.0139 U	NA
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	mg/kg	<0.00169 U	NA	NA	NA	<0.00166 U	<0.00204 U	<0.00168 U	<0.00168 U	<0.00164 U	<0.00168 U	<0.00164 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	<0.00167 U	NA
Dieldrin	60-57-1	**0.005**	mg/kg	<0.00106 U	NA	NA	NA	<0.00104 U	<0.00128 U	<0.00105 U	<0.00105 U	<0.00103 U	<0.00105 U	<0.00103 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	0.000562 J	NA
Endosulfan Sulfate	1031-07-8	2.4	mg/kg	<0.000706 U	NA	NA	NA	<0.000694 U	<0.000851 U	<0.000698 U	<0.000701 U	<0.000686 U	<0.000699 U	<0.000686 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	<0.000696 U	NA
Endrin	72-20-8	0.014	mg/kg	<0.000706 U	NA	NA	NA	<0.000694 U	<0.000851 U	<0.000698 U	<0.000701 U	<0.000686 U	<0.000699 U	<0.000686 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	<0.000696 U	NA
Endrin Aldehyde	7421-93-4	NS	mg/kg	<0.00212 U	NA	NA	NA	<0.00208 U	<0.00255 U	<0.00209 U	<0.0021 U	<0.00206 U	<0.0021 U	<0.00206 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	<0.00209 U	NA
Endrin Ketone	53494-70-5	NS	mg/kg	<0.00169 U	NA	NA	NA	<0.00166 U	<0.00204 U	<0.00168 U	<0.00168 U	<0.00164 U	<0.00168 U	<0.00164 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	<0.00167 U	NA
Gamma Bhc (Lindane)	58-89-9	0.1	mg/kg	<0.000706 U	NA	NA	NA	<0.000694 U	<0.000851 U	<0.000698 U	<0.000701 U	<0.000686 U	<0.000699 U	<0.000686 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	<0.000696 U	NA
Gamma Chlordane (Trans)	5103-74-2	NS	mg/kg	<0.00212 U	NA	NA	NA	<0.00208 U	<0.00255 U	<0.00209 U	<0.0021 U	<0.00206 U	<0.0021 U	<0.00206 U	NA	NA	NA	NA	NA	0.000774 J	NA
Gamma-Chlordane	5566-34-7	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	NA	NA
Heptachlor	76-44-8	0.042	mg/kg	<0.000847 U	NA	NA	NA	<0.000832 U	<0.00102 U	<0.000838 U	<0.000842 U	<0.000823 U	<0.000839 U	<0.000823 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	<0.000835 U	NA
Heptachlor Epoxide	1024-57-3	NS	mg/kg	<0.00318 U	NA	NA	NA	<0.00312 U	<0.00383 U	<0.00314 U	<0.00316 U	<0.00308 U	<0.00314 U	<0.00308 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	<0.00313 U	NA
Methoxychlor	72-43-5	NS	mg/kg	<0.00318 U	NA	NA	NA	<0.00312 U	<0.00383 U	<0.00314 U	<0.00316 U	<0.00308 U	<0.00314 U	<0.00308 U	<0.00188 U	<0.00184 U	<0.00204 U	<0.00195 U	<0.00216 U	<0.00313 U	NA
Toxaphene	8001-35-2	NS	mg/kg	<0.0318 U	NA	NA	NA	<0.0312 U	<0.0383 U	<0.0314 U	<0.0316 U	<0.0308 U	<0.0314 U	<0.0308 U	<0.188 U	<0.184 U	<0.204 U	<0.195 U	<0.216 U	<0.0313 U	NA
Herbicides																					
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	mg/kg	<0.183 U	NA	NA	NA	<0.17 U	<0.216 U	<0.176 U	<0.172 U	<0.169 U	<0.172 U	<0.172 U	<0.0229 U	<0.0226 U	<0.0245 U	<0.0236 U	<0.026 U	<0.176 U	NA
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	mg/kg	<0.183 U	NA	NA	NA	<0.17 U	<0.216 U	<0.176 U	<0.172 U	<0.169 U	<0.172 U	<0.172 U	<0.0229 U	<0.0226 U	<0.0245 U	<0.0236 U	<0.026 U	<0.176 U	NA
Silvex (2,4,5-Tp)	93-72-1	3.8	mg/kg	<0.183 U	NA	NA	NA	<0.17 U	<0.216 U	<0.176 U	<0.172 U	<0.169 U	<0.172 U	<0.172 U	<0.0229 U	<0.0226 U	<0.0245 U	<0.0236 U	<0.026 U	<0.176 U	NA
Polychlorinated Biphenyl																					
PCB-1016 (Aroclor 1016)	12674-11-2	NS	mg/kg	<0.0514 U	NA	NA	NA	<0.0508 U	<0.0627 U	<0.0506 U	<0.0485 U	<0.0514 U	<0.049 U	<0.0504 U	<0.019 U	<0.0186 U	<0.0206 U	<0.0197 U	<0.0218 U	<0.0525 U	NA
PCB-1221 (Aroclor 1221)	11104-28-2	NS	mg/kg	<0.0514 U	NA	NA	NA	<0.0508 U	<0.0627 U	<0.0506 U	<0.0485 U	<0.0514 U	<0.049 U	<0.0504 U	<0.019 U	<0.0186 U	<0.0206 U	<0.0197 U	<0.0218 U	<0.0525 U	NA
PCB-1232 (Aroclor 1232)	11141-16-5	NS	mg/kg	<0.0514 U	NA	NA	NA	<0.0508 U	<0.0627 U	<0.0506 U	<0.0485 U	<0.0514 U	<0.049 U	<0.0504 U	<0.019 U	<0.0186 U	<0.0206 U	<0.0197 U	<0.0218 U	<0.0525 U	NA
PCB-1242 (Aroclor 1242)	53469-21-9	NS	mg/kg	<0.0514 U	NA	NA	NA	<0.0508 U	<0.0627 U	<0.0506 U	<0.0485 U	<0.0514 U	<0.049 U	<0.0504 U	<0.019 U	<0.0186 U	<0.0206 U	<0.0197 U	<0.0218 U	<0.0525 U	NA
PCB-1248 (Aroclor 1248)	12672-29-6	NS	mg/kg	<0.0514 U	NA	NA	NA	<0.0508 U	<0.0627 U	<0.0506 U	<0.0485 U	<0.0514 U	<0.049 U	<0.0504 U	<0.019 U	<0.0186 U	<0.0206 U	<0.0197 U	<0.0218 U	<0.0525 U	NA
PCB-1254 (Aroclor 1254)	11097-69-1	NS	mg/kg	<0.0514 U	NA	NA	NA	<0.0508 U	<0.0627 U	<0.0506 U	<0.0485 U	<0.0514 U	<0.049 U	<0.0504 U	<0.019 U	<0.0186 U	<0.0206 U	<0.0197 U	<0.0218 U	0.0058 J	NA
PCB-1260 (Aroclor 1260)	11096-82-5	NS	mg/kg	<0.0514 U	NA	NA	NA	<0.0508 U	<0.0627 U	<0.0506 U	<0.0485 U	0.0333 J	<0.049 U	<0.0504 U	<0.019 U	<0.0186 U	<0.0206 U	<0.0197 U	<0.0218 U	<0.0525 U	NA
PCB-1262 (Aroclor 1262)	37324-23-5	NS	mg/kg	<0.0514 U	NA	NA	NA	<0.0508 U	<0.0627 U	<0.0506 U	<0.0485 U	<0.0514 U	<0.049 U	<0.0504 U	NA	NA	NA	NA	NA	<0.0525 U	NA
PCB-1268 (Aroclor 1268)	11100-14-4	NS	mg/kg	<0.0514 U	NA	NA	NA	<0.0508 U	<0.0627 U	<0.0506 U	<0.0485 U	<0.0514 U	<0.049 U	<0.0504 U	NA	NA	NA	NA	NA	<0.0525 U	NA
Total PCBs	1336-36-3	0.1	mg/kg	<0.0514 U	NA	NA	NA	<0.0508 U	<0.0627 U	<0.0506 U	<0.0485 U	0.0333 J	<0.049 U	<0.0504 U	<0.019 U	<0.0186 U	<0.0206 U	<0.0197 U	<0.0218 U	0.0058 J	NA
Metals																					
Aluminum	7429-90-5	NS	mg/kg	2,320	NA	NA	NA	279	367	383	314	291	432	304 J	1,390	1,670	1,150	2,210 J	1,200	450	NA
Antimony	7440-36-0	NS	mg/kg	<4.27 U	NA	NA	NA	<4.08 U	<5.09 U	<4.12 U	<4.12 U	<4.03 U	<4.03 U	<4.13 U	<2.4 U	<2.38 UJ	<2.62 U	<2.47 UJ	<2.74 U	<4.26 U	NA
Arsenic	7440-38-2	13	mg/kg	4.73	NA	NA	NA	<0.815 U	0.694 J	0.748 J	<0.825 U	0.373 J	0.637 J	<0.826 U	<1.44 U	<1.43 U	<1.57 U	1.49	<1.64 U	0.495 J	NA
Barium	7440-39-3	**350**	mg/kg	160	NA	NA	NA	1.26	2.85	3.9	1.61	2.69	6.39	1.47	3.16	3.27	2.95	5.83 J	3.38	19.4	NA
Beryllium	7440-41-7	7.2	mg/kg	0.213 J	NA	NA	NA	<0.408 U	<0.509 U	<0.412 U	<0.412 U	<0.403 U	0.062 J	<0.413 U	<0.048 U	<0.048 U	<0.053 U	<0.05 U	<0.055 U	<0.426 U	NA
Cadmium	7440-43-9	2.5	mg/kg	0.459 J	NA	NA	NA	<0.815 U	<1.02 U	0.133 J	<0.825 U	<0.807 U	<0.806 U	<0.826 U	<0.288 U	<0.286 U	<0.315 U	<0.297 U	<0.329 U	0.052 J	NA
Calcium	7440-70-2	NS	mg/kg	2,440	NA	NA	NA	215	410	273	232	285	724	290 J	287	250	339	381 J	337	837	NA
Chromium, Hexavalent	18540-29-9	**1**	mg/kg	0.245 J	NA	NA	NA	<0.838 U	<1.06 U	<0.846 U	0.191 J	0.481 J	<0.842 U	0.228 J	<0.576 U	<0.571 U	<0.63 U	<0.593 UJ	<0.658 U	<0.848 U	NA
Chromium, Total	7440-47-3	NS	mg/kg	6.3	NA	NA	NA	1.62	2.71	2.46	1.96	2.36	3.2	2.22	4.08	4.8	3.19	5.21	4	2.82	NA
Chromium, Trivalent	16065-83-1	30	mg/kg	6.06 J	NA	NA	NA	1.62	2.31 J	2.46	1.77 J	1.88 J	3.2	1.99 J	4.08	4.8	3.19	5.21	4	2.82	NA
Cobalt	7440-48-4	NS	mg/kg	2.46	NA	NA	NA	<1.63 U	0.418 J	0.393 J	0.259 J	<1.61 U	0.297 J	0.325 J	1.09	1.43	0.976	1.53	1.02	0.429 J	NA
Copper	7440-50-8	50	mg/kg	25.4	NA	NA	NA	0.224 J	0.884 J	0.892	0.318 J	0.356 J	1.44	0.211 J	<1.92 U	<1.9 U	<2.1 U	2.17	<2.19 U	2.29	NA
Cyanide	57-12-5	27	mg/kg	0.25 J	NA	NA	NA	<1 UJ	<1.2 U	<1 U	<1 U	<1 U	<1 U	<1 U	<0.576 U	<0.571 U	<0.63 U	<0.593 UJ	<0.658 U	<0.98 U	NA
Iron	7439-89-6	NS	mg/kg	5,560	NA	NA	NA	620	1,020	896	753	1,100	1,580	632	2,260	2,580	2,030	3,910 J	2,000	1,480	NA
Lead	7439-92-1	**63**	mg/kg	**1,020**	**554**	**1,050**	1.64 J	0.984 J	11.6	4.49	1.1 J	2.02 J	9.83	1.52 J	0.873	1.21	0.913	1.95	1.22	29.8	NA
Magnesium	7439-95-4	NS	mg/kg	767	NA	NA	NA	119	158	184	137	129	211	136	640	871	491	879 J	491	226	NA
Manganese	7439-96-5	1600	mg/kg	91.6	NA	NA	NA	10.5	18.9	19.1	14.5	13.8	20.5	11.8	22.2	24	19.1	39.3 J	22	26.9	NA
Mercury	7439-97-6	**0.18**	mg/kg	0.159	NA	NA	NA	<0.078 U	<0.089 U	<0.079 U	<0.067 U	<0.07 U	<0.083 U	<0.074 U	<0.0345 U	<0.0343 U	<0.0378 U	<0.0356 UJ	<0.0395 U	0.088	NA
Nickel	7440-02-0	30	mg/kg	7.6	NA	NA	NA	<2.04 U	0.98 J	1.22 J	<2.06 U	<2.02 U	0.943 J	<2.06 U	5.82	8.2	4.6	5.14	3.56	1.22 J	NA
Potassium	7440-09-7	NS	mg/kg	232	NA	NA	NA	58 J	75.7 J	77.4 J	63.4 J	55.8 J	81.8 J	62 J	279	350	234	497 J	266	78.7 J	NA
Selenium	7782-49-2	3.9	mg/kg	0.564 J	NA	NA	NA	<1.63 U	<2.04 U	<1.65 U	<1.65 U	<1.61 U	<1.61 U	<1.65 U	<2.4 U	<2.38 U	<2.62 U	<2.47 U	<2.74 U	<1.7 U	NA
Silver	7440-22-4	2	mg/kg	<0.427 U	NA	NA	NA	<0.408 U	<0.509 U	<0.412 U	<0.412 U	<0.403 U	<0.403 U	<0.413 U	<0.484 U	<0.48 U	<0.529 U	<0.498 U	<0.552 U	<0.426 U	NA
Sodium	7440-23-5	NS	mg/kg	<171 U	NA	NA	NA	<163 U	<204 U	<165 U	<165 U	<161 U	<161 U	<165 U	106	78.2	133	208 J	200	<170 U	NA
Thallium	7440-28-0	NS	mg/kg	<1.71 U	NA	NA	NA	<1.63 U	<2.04 U	<1.65 U	<1.65 U	<1.61 U	<1.61 U	<1.65 U	<1.92 U	<1.91 U	<2.1 U	<1.98 U	<2.2 U	<1.7 U	NA
Vanadium	7440-62-2	NS	mg/kg	11.7	NA	NA	NA	1.48	2.6	2.21	2	2.22	3.26	2.22	3.77	5.15	4.24	6.45	3.86	4.42	NA
Zinc	7440-66-6	**109**	mg/kg	**192**	**474**	71.9	NA	2.59 J	5.4	31.6	10.2	3.4 J	8.01	1.47 J	8.9 J	14.2 J	7	8.19 J	4.53	40.4	NA
General Chemistry																					
Solids, Percent	SOLID	NS	Percent	89.8	85.2	76	89.2	95.4	75.4	94.6	94.1	95.7	95	96.6	86.9	87.5	79.4	84.3	76	94.3	88.9

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP55	EP55	EP56	EP56	EP57	EP58	EP59	EP60	EP61	EP62	EP63	EP64	EP64	EP65	EP65	EP66	EP67	EP68	EP69
			Sample Name	EP55_EL3	EP55_EL2	EP56_EL4	EP56_EL3	EP57_EL3	EP58_EL-6	EP59_EL-6	EP60_EL-6	EP61_EL-6	EP62_EL4	EP63_EL4	EP64_EL3	EP64_EL2	EP65_EL3	EP65_EL2	EP66_EL-6	EP67_EL-6	EP68_EL-6	EP69_EL-6
			Sample Date	05/02/2025	05/12/2025	04/28/2025	05/02/2025	04/15/2025	06/13/2025	06/13/2025	06/16/2025	06/17/2025	06/20/2025	05/23/2025	05/02/2025	05/12/2025	04/17/2025	04/28/2025	06/13/2025	06/13/2025	06/16/2025	06/17/2025
			Sample Elevation	3	2	3	4	6	-6	-6	-6	-6	4	4	3	2	3	2	-6	-6	-6	-6
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																						
1,1,1,2-Tetrachloroethane	630-20-6	NS	mg/kg	<0.00054 U	NA	<0.00044 U	NA	<0.00027 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.00055 U	NA	<0.0005 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,1,1-Trichloroethane	71-55-6	0.68	mg/kg	<0.00054 U	NA	<0.00044 U	NA	<0.00027 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.00055 U	NA	<0.0005 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	mg/kg	<0.00054 U	NA	<0.00044 U	NA	<0.00027 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.00055 U	NA	<0.0005 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	NS	mg/kg	NA	NA	NA	NA	NA	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	NA	NA	NA	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,1,2-Trichloroethane	79-00-5	NS	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 UJ	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,1-Dichloroethane	75-34-3	0.27	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,1-Dichloroethene	75-35-4	0.33	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,1-Dichloropropene	563-58-6	NS	mg/kg	<0.00054 U	NA	<0.00044 U	NA	<0.00027 U	NA	NA	NA	NA	NA	NA	<0.00055 U	NA	<0.0005 U	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	87-61-6	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 UJ	<0.0022 U	NA	<0.002 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,2,3-Trichloropropane	96-18-4	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0022 U	NA	<0.002 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,2,4,5-Tetramethylbenzene	95-93-2	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	NA	NA	NA	NA	NA	NA	<0.0022 U	NA	<0.002 U	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	120-82-1	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0022 U	NA	<0.002 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,2,4-Trimethylbenzene	95-63-6	3.6	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0022 U	NA	<0.002 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	mg/kg	<0.0032 U	NA	<0.0026 U	NA	<0.0016 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 UJ	<0.0053 U	<0.0033 U	NA	<0.003 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,2-Dichlorobenzene	95-50-1	1.1	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0022 U	NA	<0.002 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,2-Dichloroethane	107-06-2	0.02	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,2-Dichloropropane	78-87-5	NS	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0022 U	NA	<0.002 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,3-Dichlorobenzene	541-73-1	2.4	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0022 U	NA	<0.002 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,3-Dichloropropane	142-28-9	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	NA	NA	NA	NA	NA	NA	<0.0022 U	NA	<0.002 U	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	106-46-7	1.8	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0022 U	NA	<0.002 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
1,4-Diethyl Benzene	105-05-5	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	NA	NA	NA	NA	NA	NA	<0.0022 U	NA	<0.002 U	NA	NA	NA	NA	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	mg/kg	<0.087 U	NA	<0.071 UJ	NA	<0.043 U	NA	NA	NA	NA	NA	NA	<0.089 U	NA	<0.081 UJ	NA	NA	NA	NA	NA
2,2-Dichloropropane	594-20-7	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	NA	NA	NA	NA	NA	NA	<0.0022 U	NA	<0.002 U	NA	NA	NA	NA	NA
2-Chlorotoluene	95-49-8	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	NA	NA	NA	NA	NA	NA	<0.0022 U	NA	<0.002 U	NA	NA	NA	NA	NA
2-Hexanone (MBK)	591-78-6	NS	mg/kg	<0.011 U	NA	<0.0088 UJ	NA	<0.0054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.011 U	NA	<0.01 UJ	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
4-Chlorotoluene	106-43-4	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	NA	NA	NA	NA	NA	NA	<0.0022 U	NA	<0.002 U	NA	NA	NA	NA	NA
4-Ethyltoluene	622-96-8	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	NA	NA	NA	NA	NA	NA	<0.0022 U	NA	<0.002 U	NA	NA	NA	NA	NA
Acetone	67-64-1	**0.05**	mg/kg	<0.011 U	NA	<0.0088 U	NA	<0.0054 U	<0.011 U	<0.011 U	0.018	0.016	0.0062 J	<0.011 U	<0.011 U	NA	<0.01 U	NA	0.011	0.0066 J	0.0074 J	0.015
Acrolein	107-02-8	NS	mg/kg	NA	NA	NA	NA	NA	<0.011 U	<0.011 U	<0.012 U	<0.013 U	<0.01 U	<0.011 U	NA	NA	NA	NA	<0.011 U	<0.011 U	<0.011 U	<0.013 U
Acrylonitrile	107-13-1	NS	mg/kg	<0.0043 U	NA	<0.0035 U	NA	<0.0022 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0044 U	NA	<0.004 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Benzene	71-43-2	0.06	mg/kg	<0.00054 U	NA	<0.00044 U	NA	<0.00027 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.00055 U	NA	<0.0005 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Bromobenzene	108-86-1	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	NA	NA	NA	NA	NA	NA	<0.0022 U	NA	<0.002 U	NA	NA	NA	NA	NA
Bromochloromethane	74-97-5	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0022 U	NA	<0.002 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Bromodichloromethane	75-27-4	NS	mg/kg	<0.00054 U	NA	<0.00044 U	NA	<0.00027 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 UJ	<0.0053 U	<0.00055 U	NA	<0.0005 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Bromoform	75-25-2	NS	mg/kg	<0.0043 U	NA	<0.0035 U	NA	<0.0022 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0044 U	NA	<0.004 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Bromomethane	74-83-9	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0022 U	NA	<0.002 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Carbon Disulfide	75-15-0	NS	mg/kg	<0.011 U	NA	<0.0088 U	NA	<0.0054 U	<0.0057 U	0.003 J	0.0069	0.0048 J	<0.0051 U	<0.0053 U	<0.011 U	NA	<0.01 U	NA	0.0045 J	0.0027 J	<0.0055 U	0.0041 J
Carbon Tetrachloride	56-23-5	0.76	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Chlorobenzene	108-90-7	1.1	mg/kg	<0.00054 U	NA	<0.00044 U	NA	<0.00027 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.00055 U	NA	<0.0005 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Chloroethane	75-00-3	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0022 U	NA	<0.002 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Chloroform	67-66-3	0.37	mg/kg	<0.0016 U	NA	<0.0013 U	NA	<0.00081 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0017 U	NA	<0.0015 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Chloromethane	74-87-3	NS	mg/kg	<0.0043 U	NA	<0.0035 U	NA	<0.0022 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0044 U	NA	<0.004 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Cis-1,2-Dichloroethene	156-59-2	0.25	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 UJ	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Cis-1,3-Dichloropropene	10061-01-5	NS	mg/kg	<0.00054 U	NA	<0.00044 U	NA	<0.00027 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 UJ	<0.0053 U	<0.00055 U	NA	<0.0005 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Cyclohexane	110-82-7	NS	mg/kg	NA	NA	NA	NA	NA	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	NA	NA	NA	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Cymene	99-87-6	NS	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Dibromochloromethane	124-48-1	NS	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Dibromomethane	74-95-3	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 UJ	<0.0053 U	<0.0022 U	NA	<0.002 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Dichlorodifluoromethane	75-71-8	NS	mg/kg	<0.011 U	NA	<0.0088 U	NA	<0.0054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 UJ	<0.0053 U	<0.011 U	NA	<0.01 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Diethyl Ether (Ethyl Ether)	60-29-7	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	NA	NA	NA	NA	NA	NA	<0.0022 U	NA	<0.002 U	NA	NA	NA	NA	NA
Ethylbenzene	100-41-4	1	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Hexachlorobutadiene	87-68-3	NS	mg/kg	<0.0043 U	NA	<0.0035 U	NA	<0.0022 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0044 U	NA	<0.004 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Isopropylbenzene (Cumene)	98-82-8	NS	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
M,P-Xylene	179601-23-1	NS	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	<0.011 U	<0.011 U	<0.012 U	<0.013 U	<0.01 U	<0.011 U	<0.0022 U	NA	<0.002 U	NA	<0.011 U	<0.011 U	<0.011 U	<0.013 U
Methyl Acetate	79-20-9	NS	mg/kg	NA	NA	NA	NA	NA	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	NA	NA	NA	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	mg/kg	<0.011 U	NA	<0.0088 U	NA	<0.0054 UJ	<0.0057 U	<0.0057 U	0.0038 J	<0.0065 U	<0.0051 U	<0.0053 U	<0.011 U	NA	<0.01 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	mg/kg	<0.011 U	NA	<0.0088 U	NA	<0.0054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 UJ	<0.0053 U	<0.011 U	NA	<0.01 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Methylcyclohexane	108-87-2	NS	mg/kg	NA	NA	NA	NA	NA	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	NA	NA	NA	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Methylene Chloride	75-09-2	0.05	mg/kg	<0.0054 U	NA	<0.0044 U	NA	<0.0027 U	<0.011 U	<0.011 U	<0.012 U	<0.013 U	<0.01 U	<0.011 U	<0.0055 U	NA	<0.005 U	NA	<0.011 U	<0.011 U	<0.011 U	<0.013 U
Naphthalene	91-20-3	12	mg/kg	<0.0043 U	NA	<0.0035 U	NA	<0.0022 U	NA	NA	NA	NA	NA	NA	<0.0044 U	NA	<0.004 U	NA	NA	NA	NA	NA
n-Butylbenzene	104-51-8	12	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
n-Propylbenzene	103-65-1	3.9	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
o-Cymene (O-Isopropyltoluene)	527-84-4	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Sec-Butylbenzene	135-98-8	11	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Styrene	100-42-5	NS	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
T-Butylbenzene	98-06-6	5.9	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 UJ	<0.0053 U	<0.0022 U	NA	<0.002 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Tert-Butyl Alcohol	75-65-0	NS	mg/kg	NA	NA	NA	NA	NA	<0.028 UJ	<0.028 UJ	<0.031 UJ	<0.032 UJ	<0.026 U	<0.0053 U	NA	NA	NA	NA	<0.028 UJ	<0.027 UJ	<0.028 UJ	<0.031 UJ
Tert-Butyl Methyl Ether (MTBE)	1634-04-4	0.93	mg/kg	<0.0022 U	NA	<0.0018 U	NA	<0.0011 U	<0.0057 UJ	<0.0057 UJ	<0.0062 UJ	<0.0065 UJ	<0.0051 U	<0.0053 U	<0.0022 U	NA	<0.002 U	NA	<0.0056 UJ	<0.0054 UJ	<0.0055 UJ	<0.0063 UJ
Tetrachloroethene (PCE)	127-18-4	1.3	mg/kg	<0.00054 U	NA	<0.00044 U	NA	<0.00027 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.00055 U	NA	<0.0005 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Tetrahydrofuran	109-99-9	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	108-88-3	0.7	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	NA	NA	NA	NA	NA	NA	<0.0011 U	NA	<0.001 U	NA	NA	NA	NA	NA
Total Xylenes	1330-20-7	0.26	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.017 U	<0.017 U	<0.019 U	<0.019 U	<0.015 U	<0.016 U	<0.0011 U	NA	<0.001 U	NA	<0.017 U	<0.016 U	<0.017 U	<0.019 U
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	NS	mg/kg	<0.00054 U	NA	<0.00044 U	NA	<0.00027 U	NA	NA	NA	NA	NA	NA	<0.00055 U	NA	<0.0005 U	NA	NA	NA	NA	NA
Trans-1,2-Dichloroethene	156-60-5	0.19	mg/kg	<0.0016 U	NA	<0.0013 U	NA	<0.00081 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0017 U	NA	<0.0015 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Trans-1,3-Dichloropropene	10061-02-6	NS	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 UJ	<0.0065 UJ	<0.0051 UJ	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 UJ	<0.0063 UJ
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	mg/kg	<0.0054 U	NA	<0.0044 U	NA	<0.0027 U	NA	NA	NA	NA	NA	NA	<0.0055 U	NA	<0.005 U	NA	NA	NA	NA	NA
Trichloroethene (TCE)	79-01-6	0.47	mg/kg	<0.00054 U	NA	<0.00044 U	NA	<0.00027 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.00055 U	NA	<0.0005 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Trichlorofluoromethane	75-69-4	NS	mg/kg	<0.0043 U	NA	<0.0035 U	NA	<0.0022 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0044 U	NA	<0.004 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U
Vinyl Acetate	108-05-4	NS	mg/kg	<0.011 U	NA	<0.0088 U	NA	<0.0054 UJ	NA	NA	NA	NA	NA	NA	<0.011 U	NA	<0.01 U	NA	NA	NA	NA	NA
Vinyl Chloride	75-01-4	0.02	mg/kg	<0.0011 U	NA	<0.00088 U	NA	<0.00054 U	<0.0057 U	<0.0057 U	<0.0062 U	<0.0065 U	<0.0051 U	<0.0053 U	<0.0011 U	NA	<0.001 U	NA	<0.0056 U	<0.0054 U	<0.0055 U	<0.0063 U

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP55	EP55	EP56	EP56	EP57	EP58	EP59	EP60	EP61	EP62	EP63	EP64	EP64	EP65	EP65	EP66	EP67	EP68	EP69
			Sample Name	EP55_EL3	EP55_EL2	EP56_EL4	EP56_EL3	EP57_EL3	EP58_EL-6	EP59_EL-6	EP60_EL-6	EP61_EL-6	EP62_EL4	EP63_EL4	EP64_EL3	EP64_EL2	EP65_EL3	EP65_EL2	EP66_EL-6	EP67_EL-6	EP68_EL-6	EP69_EL-6
			Sample Date	05/02/2025	05/12/2025	04/28/2025	05/02/2025	04/15/2025	06/13/2025	06/13/2025	06/16/2025	06/17/2025	06/20/2025	05/23/2025	05/02/2025	05/12/2025	04/17/2025	04/28/2025	06/13/2025	06/13/2025	06/16/2025	06/17/2025
			Sample Elevation	3	2	3	4	6	-6	-6	-6	-6	4	4	3	2	3	2	-6	-6	-6	-6
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																						
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.206 U	<0.201 U	<0.203 U	<0.206 U	<0.174 U	<0.178 U	<0.2 U	NA	<0.17 U	NA	<0.206 U	<0.199 U	<0.193 U	<0.208 U
1,2,4-Trichlorobenzene	120-82-1	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	NA	NA	NA	NA	NA	NA	<0.2 U	NA	<0.17 U	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	95-50-1	1.1	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	NA	NA	NA	NA	NA	NA	<0.2 U	NA	<0.17 U	NA	NA	NA	NA	NA
1,2-Diphenylhydrazine	122-66-7	NS	mg/kg	NA	NA	NA	NA	NA	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	NA	NA	NA	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
1,3-Dichlorobenzene	541-73-1	2.4	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	NA	NA	NA	NA	NA	NA	<0.2 U	NA	<0.17 U	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	106-46-7	1.8	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	NA	NA	NA	NA	NA	NA	<0.2 U	NA	<0.17 U	NA	NA	NA	NA	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	mg/kg	<0.025 U	NA	<0.026 UJ	NA	<0.026 U	<0.0185 U	<0.0187 U	<0.0192 U	<0.0196 U	<0.0196 U	<0.0196 U	<0.031 U	NA	<0.026 U	NA	<0.0185 U	<0.019 U	<0.0198 U	<0.0187 U
2,3,4,6-Tetrachlorophenol	58-90-2	NS	mg/kg	NA	NA	NA	NA	NA	<0.206 U	<0.201 U	<0.203 U	<0.206 U	<0.174 U	<0.178 U	NA	NA	NA	NA	<0.206 U	<0.199 U	<0.193 U	<0.208 U
2,4,5-Trichlorophenol	95-95-4	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
2,4,6-Trichlorophenol	88-06-2	NS	mg/kg	<0.1 U	NA	<0.1 U	NA	<0.1 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.12 U	NA	<0.1 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
2,4-Dichlorophenol	120-83-2	NS	mg/kg	<0.15 U	NA	<0.16 U	NA	<0.15 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.18 U	NA	<0.15 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
2,4-Dimethylphenol	105-67-9	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 UJ	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 UJ
2,4-Dinitrophenol	51-28-5	NS	mg/kg	<0.81 U	NA	<0.83 U	NA	<0.82 U	<0.206 U	<0.201 U	<0.203 U	<0.206 UJ	<0.174 U	<0.178 U	<0.98 U	NA	<0.82 U	NA	<0.206 U	<0.199 U	<0.193 U	<0.208 UJ
2,4-Dinitrotoluene	121-14-2	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
2,6-Dinitrotoluene	606-20-2	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
2-Chloronaphthalene	91-58-7	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
2-Chlorophenol	95-57-8	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
2-Methylnaphthalene	91-57-6	NS	mg/kg	0.67	NA	<0.21 U	NA	<0.2 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.25 U	NA	<0.2 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
2-Methylphenol (o-Cresol)	95-48-7	0.33	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
2-Nitroaniline	88-74-4	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.206 U	<0.201 U	<0.203 U	<0.206 U	<0.174 U	<0.178 U	<0.2 U	NA	<0.17 U	NA	<0.206 U	<0.199 U	<0.193 U	<0.208 U
2-Nitrophenol	88-75-5	NS	mg/kg	<0.36 U	NA	<0.37 U	NA	<0.37 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.44 U	NA	<0.37 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	mg/kg	0.038 J	NA	<0.25 U	NA	<0.25 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.3 U	NA	<0.24 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
3,3'-Dichlorobenzidine	91-94-1	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
3-Nitroaniline	99-09-2	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.206 U	<0.201 U	<0.203 U	<0.206 U	<0.174 U	<0.178 U	<0.2 U	NA	<0.17 UJ	NA	<0.206 U	<0.199 U	<0.193 U	<0.208 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	mg/kg	<0.44 U	NA	<0.45 U	NA	<0.44 U	<0.206 U	<0.201 U	<0.203 U	<0.206 U	<0.174 U	<0.178 U	<0.53 U	NA	<0.44 U	NA	<0.206 U	<0.199 U	<0.193 U	<0.208 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
4-Chloro-3-Methylphenol	59-50-7	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
4-Chloroaniline	106-47-8	NS	mg/kg	<0.17 U	NA	<0.17 UJ	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 UJ	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
4-Nitroaniline	100-01-6	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.206 U	<0.201 U	<0.203 U	<0.206 U	<0.174 U	<0.178 U	<0.2 U	NA	<0.17 U	NA	<0.206 U	<0.199 U	<0.193 U	<0.208 U
4-Nitrophenol	100-02-7	NS	mg/kg	<0.24 U	NA	<0.24 U	NA	<0.24 U	<0.206 U	<0.201 U	<0.203 U	<0.206 U	<0.174 U	<0.178 U	<0.29 U	NA	<0.24 U	NA	<0.206 U	<0.199 U	<0.193 U	<0.208 U
Acenaphthene	83-32-9	20	mg/kg	0.59	NA	<0.14 U	NA	<0.14 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.05 J	NA	0.028 J	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Acenaphthylene	208-96-8	100	mg/kg	0.21	NA	<0.14 U	NA	<0.14 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.043 J	NA	<0.14 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Acetophenone	98-86-2	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Aniline (Phenylamine, Aminobenzene)	62-53-3	NS	mg/kg	NA	NA	NA	NA	NA	<0.414 U	<0.404 U	<0.407 U	<0.414 U	<0.349 U	<0.356 U	NA	NA	NA	NA	<0.414 U	<0.398 U	<0.386 U	<0.417 U
Anthracene	120-12-7	100	mg/kg	1.9	NA	<0.1 U	NA	<0.1 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.14	NA	0.079 J	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Atrazine	1912-24-9	NS	mg/kg	NA	NA	NA	NA	NA	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	NA	NA	NA	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Benzaldehyde	100-52-7	NS	mg/kg	NA	NA	NA	NA	NA	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	NA	NA	NA	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Benzidine	92-87-5	NS	mg/kg	NA	NA	NA	NA	NA	<0.414 U	<0.404 U	<0.407 U	<0.414 U	<0.349 U	<0.356 U	NA	NA	NA	NA	<0.414 U	<0.398 U	<0.386 U	<0.417 U
Benzo(a)anthracene	56-55-3	**1**	mg/kg	**3.9**	<0.1 U	<0.1 U	NA	<0.1 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.45	NA	0.31	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Benzo(a)pyrene	50-32-8	**1**	mg/kg	**3.2**	<0.14 U	<0.14 U	NA	<0.14 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.39	NA	0.35	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Benzo(b)fluoranthene	205-99-2	**1**	mg/kg	**3.6**	<0.1 U	<0.1 U	NA	<0.1 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.46	NA	0.41	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Benzo(g,h,i)Perylene	191-24-2	100	mg/kg	1.8	NA	<0.14 U	NA	0.029 J	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.19	NA	0.22	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Benzo(k)fluoranthene	207-08-9	**0.8**	mg/kg	**1.1**	<0.1 U	<0.1 U	NA	<0.1 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.14	NA	0.15	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Benzoic Acid	65-85-0	NS	mg/kg	<0.55 U	NA	<0.56 U	NA	<0.55 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.66 U	NA	<0.55 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Benzyl Alcohol	100-51-6	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Benzyl Butyl Phthalate	85-68-7	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Biphenyl (Diphenyl)	92-52-4	NS	mg/kg	0.18 J	NA	<0.39 U	NA	<0.39 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.47 U	NA	<0.39 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Bis(2-chloroethoxy) methane	111-91-1	NS	mg/kg	<0.18 U	NA	<0.19 U	NA	<0.18 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.22 U	NA	<0.18 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	mg/kg	<0.15 U	NA	<0.16 U	NA	<0.15 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.18 U	NA	<0.15 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Bis(2-chloroisopropyl) ether	108-60-1	NS	mg/kg	<0.2 U	NA	<0.21 U	NA	<0.2 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.25 U	NA	<0.2 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Bis(2-ethylhexyl) phthalate	117-81-7	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Caprolactam	105-60-2	NS	mg/kg	NA	NA	NA	NA	NA	<0.206 U	<0.201 U	<0.203 U	<0.206 U	<0.174 U	<0.178 U	NA	NA	NA	NA	<0.206 U	<0.199 U	<0.193 U	<0.208 U
Carbazole	86-74-8	NS	mg/kg	0.54	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.037 J	NA	0.032 J	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Chrysene	218-01-9	**1**	mg/kg	**3.9**	<0.1 U	<0.1 U	NA	0.018 J	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.44	NA	0.33	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Dibenz(a,h)anthracene	53-70-3	**0.33**	mg/kg	**0.36**	<0.1 U	<0.1 U	NA	0.02 J	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.045 J	NA	0.057 J	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Dibenzofuran	132-64-9	7	mg/kg	0.76	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.039 J	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Dibutyl phthalate	84-74-2	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Diethyl phthalate	84-66-2	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Dimethyl phthalate	131-11-3	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Dioctyl phthalate	117-84-0	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	0.0508 JD	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Diphenylamine	122-39-4	NS	mg/kg	NA	NA	NA	NA	NA	<0.206 U	<0.201 U	<0.203 U	<0.206 U	<0.174 U	<0.178 U	NA	NA	NA	NA	<0.206 U	<0.199 U	<0.193 U	<0.208 U
Fluoranthene	206-44-0	100	mg/kg	7.6	NA	<0.1 U	NA	<0.1 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.88	NA	0.57	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Fluorene	86-73-7	30	mg/kg	0.87	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.055 J	NA	0.023 J	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Hexachlorobenzene	118-74-1	0.33	mg/kg	<0.1 U	NA	<0.1 U	NA	<0.1 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.12 U	NA	<0.1 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Hexachlorobutadiene	87-68-3	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Hexachlorocyclopentadiene	77-47-4	NS	mg/kg	<0.48 U	NA	<0.49 U	NA	<0.49 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.59 U	NA	<0.49 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Hexachloroethane	67-72-1	NS	mg/kg	<0.14 U	NA	<0.14 U	NA	<0.14 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.16 U	NA	<0.14 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	mg/kg	**1.6**	<0.14 U	<0.14 U	NA	0.026 J	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.14 J	NA	0.2	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Isophorone	78-59-1	NS	mg/kg	<0.15 U	NA	<0.16 U	NA	<0.15 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.18 U	NA	<0.15 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Naphthalene	91-20-3	12	mg/kg	3.9	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.048 J	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Nitrobenzene	98-95-3	NS	mg/kg	<0.15 U	NA	<0.16 U	NA	<0.15 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.18 U	NA	<0.15 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
n-Nitrosodimethylamine	62-75-9	NS	mg/kg	NA	NA	NA	NA	NA	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	NA	NA	NA	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	mg/kg	<0.17 U	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
n-Nitrosodiphenylamine	86-30-6	NS	mg/kg	<0.14 U	NA	<0.14 U	NA	<0.14 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	<0.16 U	NA	<0.14 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Pentachlorophenol	87-86-5	0.8	mg/kg	<0.14 U	NA	<0.14 U	NA	<0.14 U	<0.103 U	<0.101 U	<0.102 U	<0.103 UJ	<0.0871 U	<0.089 U	<0.16 U	NA	<0.14 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 UJ
Phenanthrene	85-01-8	100	mg/kg	9.8	NA	<0.1 U	NA	<0.1 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.69	NA	0.33	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Phenol	108-95-2	0.33	mg/kg	0.035 J	NA	<0.17 U	NA	<0.17 U	<0.103 U	<0.101 U	<0.102 U	<0.103 UJ	<0.0871 U	<0.089 U	<0.2 U	NA	<0.17 U	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 UJ
Pyrene	129-00-0	100	mg/kg	8.6	<0.1 U	<0.1 U	NA	<0.1 U	<0.103 U	<0.101 U	<0.102 U	<0.103 U	<0.0871 U	<0.089 U	0.93	NA	0.51	NA	<0.103 U	<0.0995 U	<0.0964 U	<0.104 U
Pyridine	110-86-1	NS	mg/kg	NA	NA	NA	NA	NA	<0.414 U	<0.404 U	<0.407 U	<0.414 U	<0.349 U	<0.356 U	NA	NA	NA	NA	<0.414 U	<0.398 U	<0.386 U	<0.417 U

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP55	EP55	EP56	EP56	EP57	EP58	EP59	EP60	EP61	EP62	EP63	EP64	EP64	EP65	EP65	EP66	EP67	EP68	EP69
			Sample Name	EP55_EL3	EP55_EL2	EP56_EL4	EP56_EL3	EP57_EL3	EP58_EL-6	EP59_EL-6	EP60_EL-6	EP61_EL-6	EP62_EL4	EP63_EL4	EP64_EL3	EP64_EL2	EP65_EL3	EP65_EL2	EP66_EL-6	EP67_EL-6	EP68_EL-6	EP69_EL-6
			Sample Date	05/02/2025	05/12/2025	04/28/2025	05/02/2025	04/15/2025	06/13/2025	06/13/2025	06/16/2025	06/17/2025	06/20/2025	05/23/2025	05/02/2025	05/12/2025	04/17/2025	04/28/2025	06/13/2025	06/13/2025	06/16/2025	06/17/2025
			Sample Elevation	3	2	3	4	6	-6	-6	-6	-6	4	4	3	2	3	2	-6	-6	-6	-6
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																						
4,4'-DDD	72-54-8	**0.0033**	mg/kg	**0.00374**	<0.00167 U	<0.00164 U	NA	<0.00166 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	<0.00192 U	NA	<0.00157 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
4,4'-DDE	72-55-9	**0.0033**	mg/kg	0.00315 J	NA	<0.00164 U	NA	<0.00166 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	0.00108 J	NA	<0.00157 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
4,4'-DDT	50-29-3	**0.0033**	mg/kg	**0.0308**	<0.00167 U	<0.00164 U	NA	<0.00166 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	**0.00599**	<0.00162 U	<0.00157 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Aldrin	309-00-2	0.005	mg/kg	<0.00155 U	NA	<0.00164 U	NA	<0.00166 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	<0.00192 U	NA	<0.00157 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	mg/kg	<0.000646 U	NA	<0.000684 U	NA	<0.000694 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	<0.0008 U	NA	<0.000655 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Alpha Chlordane	5103-71-9	0.094	mg/kg	0.00142 J	NA	<0.00205 U	NA	<0.00208 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	0.000835 J	NA	0.0012 J	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Alpha Endosulfan	959-98-8	2.4	mg/kg	<0.00155 U	NA	<0.00164 U	NA	<0.00166 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	<0.00192 U	NA	<0.00157 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	mg/kg	<0.00155 U	NA	<0.00164 U	NA	<0.00166 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	<0.00192 U	NA	<0.00157 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Beta Endosulfan	33213-65-9	2.4	mg/kg	<0.00155 U	NA	<0.00164 U	NA	<0.00166 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	<0.00192 U	NA	<0.00157 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Chlordane (alpha and gamma)	57-74-9	NS	mg/kg	0.0214 J	NA	<0.0137 U	NA	<0.0139 U	<0.0407 U	<0.0399 U	<0.041 U	<0.0405 U	<0.0345 UJ	<0.0345 U	<0.016 U	NA	<0.0131 U	NA	<0.0412 U	<0.0395 U	<0.0387 U	<0.0411 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	mg/kg	<0.00155 U	NA	<0.00164 U	NA	<0.00166 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	<0.00192 U	NA	<0.00157 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Dieldrin	60-57-1	**0.005**	mg/kg	0.00102 J	NA	<0.00103 U	NA	<0.00104 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	<0.0012 U	NA	<0.000982 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Endosulfan Sulfate	1031-07-8	2.4	mg/kg	<0.000646 U	NA	<0.000684 U	NA	<0.000694 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	<0.0008 U	NA	<0.000655 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Endrin	72-20-8	0.014	mg/kg	<0.000646 U	NA	<0.000684 U	NA	<0.000694 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	<0.0008 U	NA	<0.000655 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Endrin Aldehyde	7421-93-4	NS	mg/kg	<0.00194 U	NA	<0.00205 U	NA	<0.00208 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	<0.0024 U	NA	<0.00196 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Endrin Ketone	53494-70-5	NS	mg/kg	<0.00155 U	NA	<0.00164 U	NA	<0.00166 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	<0.00192 U	NA	<0.00157 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Gamma Bhc (Lindane)	58-89-9	0.1	mg/kg	<0.000646 U	NA	<0.000684 U	NA	<0.000694 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	<0.0008 U	NA	<0.000655 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Gamma Chlordane (Trans)	5103-74-2	NS	mg/kg	0.00184 J	NA	<0.00205 U	NA	<0.00208 U	NA	NA	NA	NA	NA	NA	0.000646 J	NA	0.000671 J	NA	NA	NA	NA	NA
Gamma-Chlordane	5566-34-7	NS	mg/kg	NA	NA	NA	NA	NA	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	NA	NA	NA	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Heptachlor	76-44-8	0.042	mg/kg	<0.000776 U	NA	<0.000821 U	NA	<0.000833 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	<0.00096 U	NA	<0.000786 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Heptachlor Epoxide	1024-57-3	NS	mg/kg	<0.00291 U	NA	<0.00308 U	NA	<0.00312 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	<0.0036 U	NA	<0.00295 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Methoxychlor	72-43-5	NS	mg/kg	<0.00291 U	NA	<0.00308 U	NA	<0.00312 U	<0.00204 U	<0.00199 U	<0.00205 U	<0.00202 U	<0.00172 UJ	<0.00173 U	<0.0036 U	NA	<0.00295 U	NA	<0.00206 U	<0.00197 U	<0.00193 U	<0.00205 U
Toxaphene	8001-35-2	NS	mg/kg	<0.0291 U	NA	<0.0308 U	NA	<0.0312 U	<0.204 U	<0.199 U	<0.205 U	<0.202 U	<0.172 UJ	<0.173 U	<0.036 U	NA	<0.0295 U	NA	<0.206 U	<0.197 U	<0.193 U	<0.205 U
Herbicides																						
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	mg/kg	<0.169 U	NA	<0.172 U	NA	<0.175 U	<0.0248 U	<0.0239 U	<0.0246 U	<0.0249 U	<0.0204 U	<0.0213 U	<0.2 U	NA	<0.174 U	NA	<0.025 U	<0.0239 U	<0.023 U	<0.0251 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	mg/kg	<0.169 U	NA	<0.172 U	NA	<0.175 U	<0.0248 U	<0.0239 U	<0.0246 U	<0.0249 U	<0.0204 U	<0.0213 U	<0.2 U	NA	<0.174 U	NA	<0.025 U	<0.0239 U	<0.023 U	<0.0251 U
Silvex (2,4,5-Tp)	93-72-1	3.8	mg/kg	<0.169 U	NA	<0.172 U	NA	<0.175 U	<0.0248 U	<0.0239 U	<0.0246 U	<0.0249 U	<0.0204 U	<0.0213 U	<0.2 U	NA	<0.174 U	NA	<0.025 U	<0.0239 U	<0.023 U	<0.0251 U
Polychlorinated Biphenyl																						
PCB-1016 (Aroclor 1016)	12674-11-2	NS	mg/kg	<0.0491 U	NA	<0.0485 U	NA	<0.0494 U	<0.0206 U	<0.0201 U	<0.0207 U	<0.0204 U	<0.0173 U	<0.0174 U	<0.0583 U	NA	<0.0508 U	NA	<0.0208 U	<0.0199 U	<0.0195 U	<0.0207 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	mg/kg	<0.0491 U	NA	<0.0485 U	NA	<0.0494 U	<0.0206 U	<0.0201 U	<0.0207 U	<0.0204 U	<0.0173 U	<0.0174 U	<0.0583 U	NA	<0.0508 U	NA	<0.0208 U	<0.0199 U	<0.0195 U	<0.0207 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	mg/kg	<0.0491 U	NA	<0.0485 U	NA	<0.0494 U	<0.0206 U	<0.0201 U	<0.0207 U	<0.0204 U	<0.0173 U	<0.0174 U	<0.0583 U	NA	<0.0508 U	NA	<0.0208 U	<0.0199 U	<0.0195 U	<0.0207 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	mg/kg	<0.0491 U	NA	<0.0485 U	NA	<0.0494 U	<0.0206 U	<0.0201 U	<0.0207 U	<0.0204 U	<0.0173 U	<0.0174 U	<0.0583 U	NA	<0.0508 U	NA	<0.0208 U	<0.0199 U	<0.0195 U	<0.0207 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	mg/kg	<0.0491 U	NA	<0.0485 U	NA	<0.0494 U	<0.0206 U	<0.0201 U	<0.0207 U	<0.0204 U	<0.0173 U	<0.0174 U	<0.0583 U	NA	<0.0508 U	NA	<0.0208 U	<0.0199 U	<0.0195 U	<0.0207 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	mg/kg	<0.0491 U	NA	<0.0485 U	NA	<0.0494 U	<0.0206 U	<0.0201 U	<0.0207 U	<0.0204 U	<0.0173 U	<0.0174 U	<0.0583 U	NA	<0.0508 U	NA	<0.0208 U	<0.0199 U	<0.0195 U	<0.0207 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	mg/kg	<0.0491 U	NA	<0.0485 U	NA	<0.0494 U	<0.0206 U	<0.0201 U	<0.0207 U	<0.0204 U	<0.0173 U	<0.0174 U	<0.0583 U	NA	<0.0508 U	NA	<0.0208 U	<0.0199 U	<0.0195 U	<0.0207 U
PCB-1262 (Aroclor 1262)	37324-23-5	NS	mg/kg	<0.0491 U	NA	<0.0485 U	NA	<0.0494 U	NA	NA	NA	NA	NA	NA	<0.0583 U	NA	<0.0508 U	NA	NA	NA	NA	NA
PCB-1268 (Aroclor 1268)	11100-14-4	NS	mg/kg	<0.0491 U	NA	<0.0485 U	NA	<0.0494 U	NA	NA	NA	NA	NA	NA	<0.0583 U	NA	<0.0508 U	NA	NA	NA	NA	NA
Total PCBs	1336-36-3	0.1	mg/kg	<0.0491 U	NA	<0.0485 U	NA	<0.0494 U	<0.0206 U	<0.0201 U	<0.0207 U	<0.0204 U	<0.0173 U	<0.0174 U	<0.0583 U	NA	<0.0508 U	NA	<0.0208 U	<0.0199 U	<0.0195 U	<0.0207 U
Metals																						
Aluminum	7429-90-5	NS	mg/kg	470	NA	1,540	NA	437	848	1,230	7,020	3,680	593	495	432	NA	694 J	NA	1,090	1,100	970	3,860
Antimony	7440-36-0	NS	mg/kg	<3.96 U	NA	<4 U	NA	<4.06 U	<2.6 U	<2.53 U	<2.6 U	<2.6 U	<2.18 U	<2.23 U	<4.69 U	NA	<4.1 U	NA	<2.62 U	<2.53 U	<2.45 U	<2.63 U
Arsenic	7440-38-2	13	mg/kg	0.806	NA	1.5	NA	1.01	<1.56 U	<1.52 U	3.91	2.09	<1.31 U	<1.34 U	1.97	NA	1.04	NA	<1.57 U	1.62	<1.47 U	2.27
Barium	7440-39-3	**350**	mg/kg	40.3	NA	32.8	NA	4.74	<2.59 U	2.94	16.7	9.9	<2.17 U	3.31	10	NA	15.7	NA	3.88	2.67	3.23	10.7
Beryllium	7440-41-7	7.2	mg/kg	<0.396 U	NA	0.105 J	NA	0.049 J	<0.052 U	<0.051 U	0.197	0.062	<0.044 U	<0.045 U	0.053 J	NA	0.057 J	NA	<0.053 U	<0.051 U	<0.049 U	0.081
Cadmium	7440-43-9	2.5	mg/kg	0.054 J	NA	0.211 J	NA	<0.812 U	<0.312 U	<0.304 U	<0.312 U	<0.312 UJ	<0.261 U	<0.268 U	0.055 J	NA	0.176 J	NA	<0.315 U	<0.303 U	<0.294 U	<0.315 UJ
Calcium	7440-70-2	NS	mg/kg	1,600	NA	9,220	NA	726	222	267	999	615	418	306 UJ	719	NA	3,500	NA	307	228	253	701
Chromium, Hexavalent	18540-29-9	**1**	mg/kg	0.413 J	NA	0.303 J	NA	<0.844 U	<0.623 U	<0.608 U	<0.623 U	<0.624 U	0.608	<0.535 U	<0.988 U	NA	0.23 J	NA	<0.63 U	<0.606 U	<0.588 U	<0.631 UJ
Chromium, Total	7440-47-3	NS	mg/kg	3.37	NA	5.46	NA	5.37	2.42	2.74	14.4	7.98	3.55	3.06	8.7	NA	3.43	NA	3.36	2.76	3.06	8.06
Chromium, Trivalent	16065-83-1	30	mg/kg	2.96 J	NA	5.16 J	NA	5.37	2.42	2.74	14.4	7.98	2.94	3.06	8.7	NA	3.2 J	NA	3.36	2.76	3.06	8.06
Cobalt	7440-48-4	NS	mg/kg	0.371 J	NA	1.25 J	NA	0.415 J	0.665	1.14	4.21	2.06	0.644	0.428	0.432 J	NA	1.04 J	NA	0.882	0.879	0.911	2.1
Copper	7440-50-8	50	mg/kg	2.12	NA	11.4	NA	0.757 J	<2.08 U	<2.03 U	6.14	3.19	<1.74 U	<1.79 U	1.04	NA	5.61	NA	<2.1 U	<2.02 U	<1.96 U	3.23
Cyanide	57-12-5	27	mg/kg	<1 U	NA	<0.98 U	NA	<1 U	<0.623 U	<0.608 U	<0.623 U	<0.624 U	<0.522 U	<0.535 U	<1.1 U	NA	<0.96 U	NA	<0.63 U	<0.606 U	<0.588 U	<0.631 U
Iron	7439-89-6	NS	mg/kg	1,500	NA	1,900	NA	1,450	1,240	2,280	12,600	5,870	1,080	883	3,920	NA	2,660	NA	1,780	1,890	1,530	6,710
Lead	7439-92-1	**63**	mg/kg	35	NA	**94.7**	6.26	7.19	0.924	0.76	4.86	2.99	1.86	1.32	12.4	NA	**104 J**	2.88 J	1.11	1.16	1.13	3.04
Magnesium	7439-95-4	NS	mg/kg	246	NA	2,310	NA	170	337	536	2,720	1,460	220	188	182	NA	719 J	NA	468	531	432	1,510
Manganese	7439-96-5	1600	mg/kg	22	NA	56.2	NA	24.5	14.6	20.9	127	76.3	29.6	19.6	45.7	NA	38.6 J	NA	23.1	22	17.7	84.3
Mercury	7439-97-6	**0.18**	mg/kg	<0.078 U	NA	<0.084 U	NA	<0.077 U	<0.0374 U	<0.0365 U	<0.0374 U	<0.0374 U	<0.0313 U	<0.0321 U	<0.094 U	NA	<0.078 U	NA	<0.0378 U	<0.0364 U	<0.0353 U	<0.0378 U
Nickel	7440-02-0	30	mg/kg	1.8 J	NA	4.3	NA	0.895 J	2.38	5.34	12.5	5.34	<0.867 U	<0.889 U	1.5 J	NA	1.87 J	NA	2.28	4.31	2.53	5.76
Potassium	7440-09-7	NS	mg/kg	78 J	NA	251	NA	80.7 J	194	247	1,510	949	100	111	66.6 J	NA	119 J	NA	278	194	211	951
Selenium	7782-49-2	3.9	mg/kg	<1.58 U	NA	<1.6 U	NA	<1.62 U	<2.6 U	<2.53 U	<2.6 U	<2.6 U	<2.18 U	<2.23 U	<1.87 U	NA	<1.64 U	NA	<2.62 U	<2.53 U	<2.45 U	<2.63 U
Silver	7440-22-4	2	mg/kg	<0.396 U	NA	<0.4 U	NA	<0.406 U	<0.523 U	<0.511 U	<0.523 U	0.572	<0.439 U	<0.45 U	<0.469 U	NA	<0.41 U	NA	<0.529 U	<0.509 U	<0.494 U	<0.53 U
Sodium	7440-23-5	NS	mg/kg	<158 U	NA	<160 U	NA	<162 U	81.2	103	517	591	<43.5 U	<44.6 U	<187 U	NA	<164 U	NA	131	103	201	531
Thallium	7440-28-0	NS	mg/kg	<1.58 U	NA	<1.6 U	NA	<1.62 U	<2.08 U	<2.03 U	<2.08 U	<2.08 U	<1.74 U	<1.79 U	<1.87 U	NA	<1.64 U	NA	<2.1 U	<2.03 U	<1.96 U	<2.11 U
Vanadium	7440-62-2	NS	mg/kg	7.14	NA	6.46	NA	5.05	2.69	3.21	17.5	9.7	4.13	2.61	13.3	NA	4.3	NA	3.75	3.06	3.56	9.71
Zinc	7440-66-6	**109**	mg/kg	36.7	NA	82.8	NA	20.8	3.39	16.9	25.9	12.4	3.26	9.75	29	NA	84.9 J	NA	10.1	12.1	3.81	13.5
General Chemistry																						
Solids, Percent	SOLID	NS	Percent	96.8	95.5	95.8	93.3	94.8	80.2	82.2	80.2	80.2	95.7	93.4	81	95.3	95.8	92.4	79.4	82.5	85.1	79.3

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP70	EP71	EP72	EP72	EP73	EP74	EP74	EP74	EP75	EP76	EP76	EPSW01	EPSW01	EPSW02	EPSW02	EPSW03	EPSW04	EPSW05
			Sample Name	EP70_EL4	EP71_EL4	EP72_EL3	EP72_EL2	EP73_EL4	EP74_EL4	DUP01_042125	EP74_EL3	EP75_EL4	EP76_EL4	EP76_EL3	EPSW01_EL1.5	EPSW01_EL0.5	EPSW02_EL1.5	EPSW02_EL0.5	EPSW03_EL1.5	EPSW04_EL1.5	EPSW05_EL1.5
			Sample Date	06/20/2025	05/23/2025	05/02/2025	05/12/2025	04/21/2025	04/21/2025	04/21/2025	04/28/2025	08/01/2025	05/06/2025	05/23/2025	09/15/2025	09/23/2025	09/15/2025	09/23/2025	09/15/2025	09/15/2025	09/15/2025
			Sample Elevation	4	4	3	2	4	4	4	3	4	4	3	1.5	0.5	1.5	0.5	1.5	1.5	1.5
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																					
1,1,1,2-Tetrachloroethane	630-20-6	NS	mg/kg	<0.005 U	<0.005 U	<0.00061 U	NA	<0.00054 U	<0.00053 U	<0.00051 U	NA	<0.0059 UJ	<0.00066 U	NA	<0.021 U	NA	<0.022 U	NA	<0.023 U	<0.022 U	<0.023 U
1,1,1-Trichloroethane	71-55-6	0.68	mg/kg	<0.005 U	<0.005 U	<0.00061 U	NA	<0.00054 U	<0.00053 U	<0.00051 U	NA	<0.0059 U	<0.00066 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	mg/kg	<0.005 U	<0.005 U	<0.00061 U	NA	<0.00054 U	<0.00053 U	<0.00051 U	NA	<0.0059 U	<0.00066 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	NS	mg/kg	<0.005 U	<0.005 U	NA	NA	NA	NA	NA	NA	<0.0059 U	NA	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,1,2-Trichloroethane	79-00-5	NS	mg/kg	<0.005 UJ	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,1-Dichloroethane	75-34-3	0.27	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,1-Dichloroethene	75-35-4	0.33	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,1-Dichloropropene	563-58-6	NS	mg/kg	NA	NA	<0.00061 U	NA	<0.00054 U	<0.00053 U	<0.00051 U	NA	NA	<0.00066 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	87-61-6	NS	mg/kg	<0.005 U	<0.005 UJ	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	<0.0059 U	<0.0026 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,2,3-Trichloropropane	96-18-4	NS	mg/kg	<0.005 U	<0.005 U	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	<0.0059 U	<0.0026 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,2,4,5-Tetramethylbenzene	95-93-2	NS	mg/kg	NA	NA	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	NA	<0.0026 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	120-82-1	NS	mg/kg	<0.005 U	<0.005 U	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	<0.0059 U	<0.0026 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,2,4-Trimethylbenzene	95-63-6	3.6	mg/kg	<0.005 U	<0.005 U	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	<0.0059 U	<0.0026 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	mg/kg	<0.005 UJ	<0.005 U	<0.0036 U	NA	<0.0032 U	<0.0032 U	<0.003 U	NA	<0.0059 U	<0.004 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,2-Dichlorobenzene	95-50-1	1.1	mg/kg	<0.005 U	<0.005 U	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	<0.0059 U	<0.0026 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,2-Dichloroethane	107-06-2	0.02	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,2-Dichloropropane	78-87-5	NS	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	mg/kg	<0.005 U	<0.005 U	<0.0024 U	NA	<0.0022 U	0.00027 J	<0.002 U	NA	<0.0059 U	<0.0026 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,3-Dichlorobenzene	541-73-1	2.4	mg/kg	<0.005 U	<0.005 U	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	<0.0059 U	<0.0026 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,3-Dichloropropane	142-28-9	NS	mg/kg	NA	NA	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	NA	<0.0026 U	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	106-46-7	1.8	mg/kg	<0.005 U	<0.005 U	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	<0.0059 U	<0.0026 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
1,4-Diethyl Benzene	105-05-5	NS	mg/kg	NA	NA	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	NA	<0.0026 U	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	mg/kg	NA	NA	<0.097 U	NA	<0.086 U	<0.085 U	<0.082 U	NA	NA	<0.11 U	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	594-20-7	NS	mg/kg	NA	NA	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	NA	<0.0026 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	95-49-8	NS	mg/kg	NA	NA	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	NA	<0.0026 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone (MBK)	591-78-6	NS	mg/kg	<0.005 U	<0.005 U	<0.012 U	NA	<0.011 U	<0.011 U	<0.01 U	NA	<0.0059 U	<0.013 UJ	NA	<0.027 U	NA	<0.027 U	NA	<0.028 U	<0.028 U	<0.028 U
4-Chlorotoluene	106-43-4	NS	mg/kg	NA	NA	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	NA	<0.0026 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Ethyltoluene	622-96-8	NS	mg/kg	NA	NA	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	NA	<0.0026 U	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	67-64-1	**0.05**	mg/kg	0.0061 J	<0.01 U	<0.012 U	NA	<0.011 U	0.0064 J	<0.01 U	NA	<0.012 U	0.012 J	NA	<0.05 U	NA	<0.05 U	NA	<0.05 U	<0.05 U	<0.05 U
Acrolein	107-02-8	NS	mg/kg	<0.01 U	<0.01 U	NA	NA	NA	NA	NA	NA	<0.012 U	NA	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Acrylonitrile	107-13-1	NS	mg/kg	<0.005 U	<0.005 U	<0.0049 U	NA	<0.0043 U	<0.0042 U	<0.0041 U	NA	<0.0059 U	<0.0053 U	NA	<0.021 U	NA	<0.022 U	NA	<0.023 U	<0.022 U	<0.023 U
Benzene	71-43-2	0.06	mg/kg	<0.005 U	<0.005 U	<0.00061 U	NA	<0.00054 U	<0.00053 U	<0.00051 U	NA	<0.0059 U	<0.00066 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Bromobenzene	108-86-1	NS	mg/kg	NA	NA	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	NA	<0.0026 U	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	74-97-5	NS	mg/kg	<0.005 U	<0.005 U	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	<0.0059 U	<0.0026 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Bromodichloromethane	75-27-4	NS	mg/kg	<0.005 UJ	<0.005 U	<0.00061 U	NA	<0.00054 U	<0.00053 U	<0.00051 U	NA	<0.0059 U	<0.00066 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Bromoform	75-25-2	NS	mg/kg	<0.005 U	<0.005 U	<0.0049 U	NA	<0.0043 U	<0.0042 U	<0.0041 U	NA	<0.0059 UJ	<0.0053 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Bromomethane	74-83-9	NS	mg/kg	<0.005 U	<0.005 U	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	<0.0059 U	<0.0026 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Carbon Disulfide	75-15-0	NS	mg/kg	<0.005 U	<0.005 U	<0.012 U	NA	<0.011 U	<0.011 U	<0.01 U	NA	<0.0059 U	<0.013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Carbon Tetrachloride	56-23-5	0.76	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Chlorobenzene	108-90-7	1.1	mg/kg	<0.005 U	<0.005 U	<0.00061 U	NA	<0.00054 U	<0.00053 U	<0.00051 U	NA	<0.0059 U	<0.00066 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Chloroethane	75-00-3	NS	mg/kg	<0.005 U	<0.005 U	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	<0.0059 U	<0.0026 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Chloroform	67-66-3	0.37	mg/kg	<0.005 U	<0.005 U	<0.0018 U	NA	<0.0016 U	<0.0016 U	<0.0015 U	NA	<0.0059 U	<0.002 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Chloromethane	74-87-3	NS	mg/kg	<0.005 U	<0.005 U	<0.0049 U	NA	<0.0043 U	<0.0042 U	<0.0041 U	NA	<0.0059 U	<0.0053 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Cis-1,2-Dichloroethene	156-59-2	0.25	mg/kg	<0.005 UJ	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 UJ	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Cis-1,3-Dichloropropene	10061-01-5	NS	mg/kg	<0.005 UJ	<0.005 U	<0.00061 U	NA	<0.00054 U	<0.00053 U	<0.00051 U	NA	<0.0059 U	<0.00066 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Cyclohexane	110-82-7	NS	mg/kg	<0.005 U	<0.005 U	NA	NA	NA	NA	NA	NA	<0.0059 U	NA	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Cymene	99-87-6	NS	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Dibromochloromethane	124-48-1	NS	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Dibromomethane	74-95-3	NS	mg/kg	<0.005 UJ	<0.005 U	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	<0.0059 U	<0.0026 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Dichlorodifluoromethane	75-71-8	NS	mg/kg	<0.005 UJ	<0.005 U	<0.012 U	NA	<0.011 U	<0.011 U	<0.01 U	NA	<0.0059 U	<0.013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Diethyl Ether (Ethyl Ether)	60-29-7	NS	mg/kg	NA	NA	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	NA	<0.0026 U	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	100-41-4	1	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Hexachlorobutadiene	87-68-3	NS	mg/kg	<0.005 U	<0.005 U	<0.0049 U	NA	<0.0043 U	<0.0042 U	<0.0041 U	NA	<0.0059 UJ	<0.0053 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Isopropylbenzene (Cumene)	98-82-8	NS	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
M,P-Xylene	179601-23-1	NS	mg/kg	<0.01 U	<0.01 U	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	<0.012 U	<0.0026 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Methyl Acetate	79-20-9	NS	mg/kg	<0.005 U	<0.005 U	NA	NA	NA	NA	NA	NA	<0.0059 U	NA	NA	<0.053 U	NA	<0.054 U	NA	<0.056 U	<0.055 U	<0.057 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	mg/kg	<0.005 U	<0.005 U	<0.012 U	NA	<0.011 U	<0.011 U	<0.01 U	NA	<0.0059 U	<0.013 U	NA	<0.032 U	NA	<0.033 U	NA	<0.034 U	<0.033 U	<0.034 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	mg/kg	<0.005 UJ	<0.005 U	<0.012 U	NA	<0.011 U	<0.011 U	<0.01 U	NA	<0.0059 U	<0.013 U	NA	<0.027 U	NA	<0.027 U	NA	<0.028 U	<0.028 U	<0.028 U
Methylcyclohexane	108-87-2	NS	mg/kg	<0.005 U	<0.005 U	NA	NA	NA	NA	NA	NA	<0.0059 U	NA	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Methylene Chloride	75-09-2	0.05	mg/kg	<0.01 U	<0.01 U	<0.0061 U	NA	<0.0054 U	<0.0053 U	<0.0051 U	NA	<0.012 U	<0.0066 U	NA	<0.027 U	NA	<0.027 U	NA	<0.028 U	<0.028 U	<0.028 U
Naphthalene	91-20-3	12	mg/kg	NA	NA	<0.0049 U	NA	<0.0043 U	<0.0042 U	<0.0041 U	NA	NA	<0.0053 UJ	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	104-51-8	12	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
n-Propylbenzene	103-65-1	3.9	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
o-Cymene (O-Isopropyltoluene)	527-84-4	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Sec-Butylbenzene	135-98-8	11	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Styrene	100-42-5	NS	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 UJ	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
T-Butylbenzene	98-06-6	5.9	mg/kg	<0.005 UJ	<0.005 U	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	<0.0059 U	<0.0026 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Tert-Butyl Alcohol	75-65-0	NS	mg/kg	<0.025 U	<0.005 U	NA	NA	NA	NA	NA	NA	<0.029 U	NA	NA	<0.11 U	NA	<0.11 U	NA	<0.11 U	<0.11 U	<0.11 U
Tert-Butyl Methyl Ether (MTBE)	1634-04-4	0.93	mg/kg	<0.005 U	<0.005 U	<0.0024 U	NA	<0.0022 U	<0.0021 U	<0.002 U	NA	<0.0059 U	<0.0026 U	NA	<0.011 U	NA	<0.011 U	NA	<0.011 U	<0.011 U	<0.011 U
Tetrachloroethene (PCE)	127-18-4	1.3	mg/kg	<0.005 U	<0.005 U	<0.00061 U	NA	<0.00054 U	<0.00053 U	<0.00051 U	NA	<0.0059 UJ	<0.00066 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Tetrahydrofuran	109-99-9	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	108-88-3	0.7	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	mg/kg	NA	NA	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	NA	<0.0013 U	NA	NA	NA	NA	NA	NA	NA	NA
Total Xylenes	1330-20-7	0.26	mg/kg	<0.015 U	<0.015 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.018 U	<0.0013 U	NA	NA	NA	NA	NA	NA	NA	NA
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	NS	mg/kg	NA	NA	<0.00061 U	NA	<0.00054 U	<0.00053 U	<0.00051 U	NA	NA	<0.00066 U	NA	NA	NA	NA	NA	NA	NA	NA
Trans-1,2-Dichloroethene	156-60-5	0.19	mg/kg	<0.005 U	<0.005 U	<0.0018 U	NA	<0.0016 U	<0.0016 U	<0.0015 U	NA	<0.0059 U	<0.002 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Trans-1,3-Dichloropropene	10061-02-6	NS	mg/kg	<0.005 UJ	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 UJ	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	mg/kg	NA	NA	<0.0061 U	NA	<0.0054 U	<0.0053 U	<0.0051 U	NA	NA	<0.0066 U	NA	<0.011 U	NA	<0.011 U	NA	<0.011 U	<0.011 U	<0.011 U
Trichloroethene (TCE)	79-01-6	0.47	mg/kg	<0.005 U	<0.005 U	<0.00061 U	NA	<0.00054 U	<0.00053 U	<0.00051 U	NA	<0.0059 U	<0.00066 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Trichlorofluoromethane	75-69-4	NS	mg/kg	<0.005 U	<0.005 U	<0.0049 U	NA	<0.0043 U	<0.0042 U	<0.0041 U	NA	<0.0059 U	<0.0053 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U
Vinyl Acetate	108-05-4	NS	mg/kg	NA	NA	<0.012 UJ	NA	<0.011 U	<0.011 U	<0.01 U	NA	NA	<0.013 UJ	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Chloride	75-01-4	0.02	mg/kg	<0.005 U	<0.005 U	<0.0012 U	NA	<0.0011 U	<0.0011 U	<0.001 U	NA	<0.0059 U	<0.0013 U	NA	<0.0053 U	NA	<0.0054 U	NA	<0.0056 U	<0.0055 U	<0.0057 U

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP70	EP71	EP72	EP72	EP73	EP74	EP74	EP74	EP75	EP76	EP76	EPSW01	EPSW01	EPSW02	EPSW02	EPSW03	EPSW04	EPSW05
			Sample Name	EP70_EL4	EP71_EL4	EP72_EL3	EP72_EL2	EP73_EL4	EP74_EL4	DUP01_042125	EP74_EL3	EP75_EL4	EP76_EL4	EP76_EL3	EPSW01_EL1.5	EPSW01_EL0.5	EPSW02_EL1.5	EPSW02_EL0.5	EPSW03_EL1.5	EPSW04_EL1.5	EPSW05_EL1.5
			Sample Date	06/20/2025	05/23/2025	05/02/2025	05/12/2025	04/21/2025	04/21/2025	04/21/2025	04/28/2025	08/01/2025	05/06/2025	05/23/2025	09/15/2025	09/23/2025	09/15/2025	09/23/2025	09/15/2025	09/15/2025	09/15/2025
			Sample Elevation	4	4	3	2	4	4	4	3	4	4	3	1.5	0.5	1.5	0.5	1.5	1.5	1.5
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																					
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	mg/kg	<0.174 U	<0.174 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.174 U	<0.18 U	NA	<0.179 U	NA	<0.179 U	NA	<0.189 U	<0.185 U	<0.183 U
1,2,4-Trichlorobenzene	120-82-1	NS	mg/kg	NA	NA	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	NA	<0.18 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	95-50-1	1.1	mg/kg	NA	NA	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	NA	<0.18 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Diphenylhydrazine	122-66-7	NS	mg/kg	<0.0873 U	<0.0873 U	NA	NA	NA	NA	NA	NA	<0.0872 U	NA	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
1,3-Dichlorobenzene	541-73-1	2.4	mg/kg	NA	NA	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	NA	<0.18 U	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	106-46-7	1.8	mg/kg	NA	NA	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	NA	<0.18 U	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	mg/kg	<0.0194 U	<0.0196 U	<0.028 U	NA	<0.026 U	<0.026 U	<0.025 U	NA	<0.0198 U	<0.027 U	NA	<0.0196 U	NA	<0.0194 U	NA	<0.0198 U	<0.0196 U	<0.0196 U
2,3,4,6-Tetrachlorophenol	58-90-2	NS	mg/kg	<0.174 U	<0.174 U	NA	NA	NA	NA	NA	NA	<0.174 U	NA	NA	<0.179 U	NA	<0.179 U	NA	<0.189 U	<0.185 U	<0.183 U
2,4,5-Trichlorophenol	95-95-4	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
2,4,6-Trichlorophenol	88-06-2	NS	mg/kg	<0.0873 U	<0.0873 U	<0.11 U	NA	<0.1 U	<0.1 U	<0.1 U	NA	<0.0872 U	<0.11 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
2,4-Dichlorophenol	120-83-2	NS	mg/kg	<0.0873 U	<0.0873 U	<0.17 U	NA	<0.15 U	<0.15 U	<0.15 U	NA	<0.0872 U	<0.16 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
2,4-Dimethylphenol	105-67-9	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
2,4-Dinitrophenol	51-28-5	NS	mg/kg	<0.174 U	<0.174 U	<0.89 U	NA	<0.82 UJ	<0.82 UJ	<0.81 UJ	NA	<0.174 UJ	<0.87 U	NA	<0.179 U	NA	<0.179 U	NA	<0.189 U	<0.185 U	<0.183 U
2,4-Dinitrotoluene	121-14-2	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
2,6-Dinitrotoluene	606-20-2	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
2-Chloronaphthalene	91-58-7	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
2-Chlorophenol	95-57-8	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
2-Methylnaphthalene	91-57-6	NS	mg/kg	<0.0873 U	<0.0873 U	<0.22 U	NA	<0.2 U	0.024 J	0.03 J	NA	<0.0872 U	0.094 J	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
2-Methylphenol (o-Cresol)	95-48-7	0.33	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
2-Nitroaniline	88-74-4	NS	mg/kg	<0.174 U	<0.174 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.174 U	<0.18 U	NA	<0.179 U	NA	<0.179 U	NA	<0.189 U	<0.185 U	<0.183 U
2-Nitrophenol	88-75-5	NS	mg/kg	<0.0873 U	<0.0873 U	<0.4 U	NA	<0.37 U	<0.37 U	<0.36 U	NA	<0.0872 U	<0.39 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	mg/kg	<0.0873 U	<0.0873 U	<0.27 U	NA	<0.25 U	<0.25 U	<0.24 U	NA	<0.0872 UJ	<0.26 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
3,3'-Dichlorobenzidine	91-94-1	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
3-Nitroaniline	99-09-2	NS	mg/kg	<0.174 U	<0.174 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.174 U	<0.18 U	NA	<0.179 U	NA	<0.179 U	NA	<0.189 U	<0.185 U	<0.183 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	mg/kg	<0.174 U	<0.174 U	<0.48 U	NA	<0.44 UJ	<0.44 UJ	<0.44 UJ	NA	<0.174 UJ	<0.47 U	NA	<0.179 U	NA	<0.179 U	NA	<0.189 U	<0.185 U	<0.183 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
4-Chloro-3-Methylphenol	59-50-7	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
4-Chloroaniline	106-47-8	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
4-Nitroaniline	100-01-6	NS	mg/kg	<0.174 U	<0.174 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.174 U	<0.18 U	NA	<0.179 U	NA	<0.179 U	NA	<0.189 U	<0.185 U	<0.183 U
4-Nitrophenol	100-02-7	NS	mg/kg	<0.174 U	<0.174 U	<0.26 U	NA	<0.24 U	<0.24 U	<0.24 U	NA	<0.174 U	<0.25 U	NA	<0.179 U	NA	<0.179 U	NA	<0.189 U	<0.185 U	<0.183 U
Acenaphthene	83-32-9	20	mg/kg	<0.0873 U	<0.0873 U	<0.15 U	NA	0.024 J	0.034 J	<0.14 U	NA	<0.0872 U	0.25	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Acenaphthylene	208-96-8	100	mg/kg	<0.0873 U	<0.0873 U	<0.15 U	NA	<0.14 U	0.04 J	0.074 J	NA	<0.0872 U	0.092 J	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Acetophenone	98-86-2	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Aniline (Phenylamine, Aminobenzene)	62-53-3	NS	mg/kg	<0.35 U	<0.35 U	NA	NA	NA	NA	NA	NA	<0.349 UJ	NA	NA	<0.359 U	NA	<0.359 U	NA	<0.379 U	<0.37 U	<0.366 U
Anthracene	120-12-7	100	mg/kg	<0.0873 U	<0.0873 U	<0.11 U	NA	0.082 J	0.11	0.079 J	NA	0.0927 D	0.47	NA	<0.0898 U	NA	0.0523 JD	NA	<0.0946 U	<0.0924 U	<0.0915 U
Atrazine	1912-24-9	NS	mg/kg	<0.0873 U	<0.0873 U	NA	NA	NA	NA	NA	NA	<0.0872 U	NA	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Benzaldehyde	100-52-7	NS	mg/kg	<0.0873 U	<0.0873 U	NA	NA	NA	NA	NA	NA	<0.0872 U	NA	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Benzidine	92-87-5	NS	mg/kg	<0.35 U	<0.35 U	NA	NA	NA	NA	NA	NA	<0.349 U	NA	NA	<0.359 U	NA	<0.359 U	NA	<0.379 U	<0.37 U	<0.366 U
Benzo(a)anthracene	56-55-3	**1**	mg/kg	<0.0873 U	<0.0873 U	0.12	NA	0.35	0.34	0.34	NA	0.199 D	**1.3**	<0.0876 U	<0.0898 U	NA	0.217 D	NA	<0.0946 U	<0.0924 U	<0.0915 U
Benzo(a)pyrene	50-32-8	**1**	mg/kg	<0.0873 U	<0.0873 U	0.12 J	NA	0.34	0.36	0.42	NA	0.18 D	1	<0.0876 U	<0.0898 U	NA	0.211 D	NA	<0.0946 U	<0.0924 U	<0.0915 U
Benzo(b)fluoranthene	205-99-2	**1**	mg/kg	<0.0873 U	<0.0873 U	0.14	NA	0.45	0.46	0.54	NA	0.132 D	**1.3**	<0.0876 U	<0.0898 U	NA	0.172 D	NA	<0.0946 U	<0.0924 U	<0.0915 U
Benzo(g,h,i)Perylene	191-24-2	100	mg/kg	<0.0873 U	<0.0873 U	0.077 J	NA	0.2 J	0.24 J	0.31 J	NA	0.125 D	0.73	NA	0.124 D	NA	0.132 D	NA	<0.0946 U	<0.0924 U	<0.0915 U
Benzo(k)fluoranthene	207-08-9	**0.8**	mg/kg	<0.0873 U	<0.0873 U	0.042 J	NA	0.13	0.16	0.16	NA	0.226 D	0.39	NA	<0.0898 U	NA	0.155 D	NA	<0.0946 U	<0.0924 U	<0.0915 U
Benzoic Acid	65-85-0	NS	mg/kg	<0.0873 U	<0.0873 U	<0.6 U	NA	<0.55 U	<0.55 U	<0.55 U	NA	<0.0872 U	<0.59 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Benzyl Alcohol	100-51-6	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 UJ	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Benzyl Butyl Phthalate	85-68-7	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Biphenyl (Diphenyl)	92-52-4	NS	mg/kg	<0.0873 U	<0.0873 U	<0.42 U	NA	<0.39 U	<0.39 U	<0.38 U	NA	<0.0872 U	0.026 J	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Bis(2-chloroethoxy) methane	111-91-1	NS	mg/kg	<0.0873 U	<0.0873 U	<0.2 U	NA	<0.18 U	<0.18 U	<0.18 U	NA	<0.0872 U	<0.2 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	mg/kg	<0.0873 U	<0.0873 U	<0.17 U	NA	<0.15 U	<0.15 U	<0.15 U	NA	<0.0872 U	<0.16 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Bis(2-chloroisopropyl) ether	108-60-1	NS	mg/kg	<0.0873 U	<0.0873 U	<0.22 U	NA	<0.2 U	<0.2 U	<0.2 U	NA	<0.0872 UJ	<0.22 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Bis(2-ethylhexyl) phthalate	117-81-7	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	0.065 J	NA	<0.0872 U	0.08 J	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Caprolactam	105-60-2	NS	mg/kg	<0.174 U	<0.174 U	NA	NA	NA	NA	NA	NA	<0.174 U	NA	NA	<0.179 U	NA	<0.179 U	NA	<0.189 U	<0.185 U	<0.183 U
Carbazole	86-74-8	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	0.025 J	0.037 J	0.026 J	NA	<0.0872 UJ	0.11 J	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Chrysene	218-01-9	**1**	mg/kg	<0.0873 U	<0.0873 U	0.11	NA	0.36	0.33	0.36	NA	0.196 D	**1.2**	<0.0876 U	<0.0898 U	NA	0.203 D	NA	<0.0946 U	<0.0924 U	<0.0915 U
Dibenz(a,h)anthracene	53-70-3	**0.33**	mg/kg	<0.0873 U	<0.0873 U	<0.11 U	NA	0.05 J	0.058 J	0.072 J	NA	<0.0872 U	0.17	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Dibenzofuran	132-64-9	7	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	0.016 J	<0.17 U	NA	<0.0872 U	0.11 J	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Dibutyl phthalate	84-74-2	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Diethyl phthalate	84-66-2	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Dimethyl phthalate	131-11-3	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Dioctyl phthalate	117-84-0	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Diphenylamine	122-39-4	NS	mg/kg	<0.174 U	<0.174 U	NA	NA	NA	NA	NA	NA	<0.174 UJ	NA	NA	<0.179 U	NA	<0.179 U	NA	<0.189 U	<0.185 U	<0.183 U
Fluoranthene	206-44-0	100	mg/kg	<0.0873 U	<0.0873 U	0.29	NA	0.64	0.67	0.55	NA	0.473 D	2	NA	0.0452 JD	NA	0.445 D	NA	<0.0946 U	<0.0924 U	<0.0915 U
Fluorene	86-73-7	30	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	0.018 J	0.028 J	0.016 J	NA	<0.0872 U	0.19	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Hexachlorobenzene	118-74-1	0.33	mg/kg	<0.0873 U	<0.0873 U	<0.11 U	NA	<0.1 U	<0.1 U	<0.1 U	NA	<0.0872 U	<0.11 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Hexachlorobutadiene	87-68-3	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 UJ	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Hexachlorocyclopentadiene	77-47-4	NS	mg/kg	<0.0873 U	<0.0873 U	<0.53 U	NA	<0.49 UJ	<0.49 UJ	<0.48 UJ	NA	<0.0872 UJ	<0.52 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Hexachloroethane	67-72-1	NS	mg/kg	<0.0873 U	<0.0873 U	<0.15 U	NA	<0.14 U	<0.14 U	<0.14 U	NA	<0.0872 U	<0.14 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	mg/kg	<0.0873 U	<0.0873 U	0.068 J	NA	0.21 J	0.24	0.3	NA	0.099 D	**0.68**	<0.0876 U	<0.0898 U	NA	0.15 D	NA	<0.0946 U	<0.0924 U	<0.0915 U
Isophorone	78-59-1	NS	mg/kg	<0.0873 U	<0.0873 U	<0.17 U	NA	<0.15 U	<0.15 U	<0.15 U	NA	<0.0872 U	<0.16 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Naphthalene	91-20-3	12	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	0.033 J	0.036 J	NA	<0.0872 U	0.28	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Nitrobenzene	98-95-3	NS	mg/kg	<0.0873 U	<0.0873 U	<0.17 U	NA	<0.15 U	<0.15 U	<0.15 U	NA	<0.0872 U	<0.16 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
n-Nitrosodimethylamine	62-75-9	NS	mg/kg	<0.0873 U	<0.0873 U	NA	NA	NA	NA	NA	NA	<0.0872 U	NA	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 UJ	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
n-Nitrosodiphenylamine	86-30-6	NS	mg/kg	<0.0873 U	<0.0873 U	<0.15 U	NA	<0.14 U	<0.14 U	<0.14 U	NA	<0.0872 U	<0.14 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Pentachlorophenol	87-86-5	0.8	mg/kg	<0.0873 U	<0.0873 U	<0.15 U	NA	<0.14 U	<0.14 U	<0.14 U	NA	<0.0872 U	<0.14 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Phenanthrene	85-01-8	100	mg/kg	<0.0873 U	<0.0873 U	0.093 J	NA	0.28	0.38	0.19	NA	0.273 D	2.1	NA	<0.0898 U	NA	0.225 D	NA	<0.0946 U	<0.0924 U	<0.0915 U
Phenol	108-95-2	0.33	mg/kg	<0.0873 U	<0.0873 U	<0.18 U	NA	<0.17 U	<0.17 U	<0.17 U	NA	<0.0872 U	<0.18 U	NA	<0.0898 U	NA	<0.0896 U	NA	<0.0946 U	<0.0924 U	<0.0915 U
Pyrene	129-00-0	100	mg/kg	<0.0873 U	<0.0873 U	0.3	NA	0.58	0.57	0.56	NA	0.39 D	2.2	NA	0.0488 JD	NA	0.434 D	NA	<0.0946 U	<0.0924 U	<0.0915 U
Pyridine	110-86-1	NS	mg/kg	<0.35 U	<0.35 U	NA	NA	NA	NA	NA	NA	<0.349 U	NA	NA	<0.359 U	NA	<0.359 U	NA	<0.379 U	<0.37 U	<0.366 U

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP70	EP71	EP72	EP72	EP73	EP74	EP74	EP74	EP75	EP76	EP76	EPSW01	EPSW01	EPSW02	EPSW02	EPSW03	EPSW04	EPSW05
			Sample Name	EP70_EL4	EP71_EL4	EP72_EL3	EP72_EL2	EP73_EL4	EP74_EL4	DUP01_042125	EP74_EL3	EP75_EL4	EP76_EL4	EP76_EL3	EPSW01_EL1.5	EPSW01_EL0.5	EPSW02_EL1.5	EPSW02_EL0.5	EPSW03_EL1.5	EPSW04_EL1.5	EPSW05_EL1.5
			Sample Date	06/20/2025	05/23/2025	05/02/2025	05/12/2025	04/21/2025	04/21/2025	04/21/2025	04/28/2025	08/01/2025	05/06/2025	05/23/2025	09/15/2025	09/23/2025	09/15/2025	09/23/2025	09/15/2025	09/15/2025	09/15/2025
			Sample Elevation	4	4	3	2	4	4	4	3	4	4	3	1.5	0.5	1.5	0.5	1.5	1.5	1.5
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																					
4,4'-DDD	72-54-8	**0.0033**	mg/kg	<0.00173 U	<0.00172 U	0.00127 J	NA	<0.00162 U	<0.00164 U	<0.00166 U	NA	<0.00173 U	0.00321	NA	<0.00176 U	NA	0.00216 D	NA	<0.00186 U	<0.00181 U	<0.0018 U
4,4'-DDE	72-55-9	**0.0033**	mg/kg	<0.00173 U	<0.00172 U	0.00172	NA	<0.00162 U	0.00083 J	0.00154 J	NA	<0.00173 U	**0.0116**	<0.00172 U	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
4,4'-DDT	50-29-3	**0.0033**	mg/kg	<0.00173 U	<0.00172 U	**0.00768**	<0.00158 U	<0.00162 U	0.00137 J	0.00202	NA	<0.00173 U	**0.0382**	<0.00172 U	<0.00176 U	NA	**0.00587 D**	<0.00188 U	<0.00186 U	<0.00181 U	<0.0018 U
Aldrin	309-00-2	0.005	mg/kg	<0.00173 U	<0.00172 U	<0.00171 U	NA	<0.00162 U	<0.00164 U	0.000779 J	NA	<0.00173 U	0.000685 J	NA	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	mg/kg	<0.00173 U	<0.00172 U	<0.000714 U	NA	<0.000674 U	<0.000685 U	<0.000692 U	NA	<0.00173 U	<0.000704 U	NA	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
Alpha Chlordane	5103-71-9	0.094	mg/kg	<0.00173 U	<0.00172 U	<0.00214 U	NA	<0.00202 U	0.00204 J	0.00423 J	NA	<0.00173 U	0.00422 J	NA	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
Alpha Endosulfan	959-98-8	2.4	mg/kg	<0.00173 U	<0.00172 U	<0.00171 U	NA	<0.00162 U	<0.00164 U	<0.00166 U	NA	<0.00173 U	<0.00169 U	NA	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	mg/kg	<0.00173 U	<0.00172 U	<0.00171 U	NA	<0.00162 U	<0.00164 U	<0.00166 U	NA	<0.00173 U	<0.00169 U	NA	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
Beta Endosulfan	33213-65-9	2.4	mg/kg	<0.00173 U	<0.00172 U	<0.00171 U	NA	<0.00162 U	<0.00164 U	<0.00166 U	NA	<0.00173 U	<0.00169 U	NA	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
Chlordane (alpha and gamma)	57-74-9	NS	mg/kg	<0.0346 U	<0.0344 U	<0.0143 U	NA	<0.0135 U	0.0282	0.0429	NA	<0.0345 U	0.0419 J	NA	<0.0353 U	NA	<0.0353 U	NA	<0.0373 U	<0.0362 U	<0.036 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	mg/kg	<0.00173 U	<0.00172 U	<0.00171 U	NA	<0.00162 U	<0.00164 U	<0.00166 U	NA	<0.00173 U	<0.00169 U	NA	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
Dieldrin	60-57-1	**0.005**	mg/kg	<0.00173 U	<0.00172 U	<0.00107 U	NA	<0.00101 U	0.00178	0.00288	NA	<0.00173 U	0.00282	NA	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
Endosulfan Sulfate	1031-07-8	2.4	mg/kg	<0.00173 U	<0.00172 U	<0.000714 U	NA	<0.000674 U	<0.000685 U	<0.000692 U	NA	<0.00173 U	<0.000704 U	NA	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
Endrin	72-20-8	0.014	mg/kg	<0.00173 U	<0.00172 U	<0.000714 U	NA	<0.000674 U	<0.000685 U	<0.000692 U	NA	<0.00173 U	<0.000704 U	NA	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
Endrin Aldehyde	7421-93-4	NS	mg/kg	<0.00173 U	<0.00172 U	<0.00214 U	NA	<0.00202 U	<0.00205 U	<0.00208 U	NA	<0.00173 U	<0.00211 U	NA	<0.00176 U	NA	0.00222 D	NA	<0.00186 U	<0.00181 U	<0.0018 U
Endrin Ketone	53494-70-5	NS	mg/kg	<0.00173 U	<0.00172 U	<0.00171 U	NA	<0.00162 U	<0.00164 U	<0.00166 U	NA	<0.00173 U	<0.00169 U	NA	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
Gamma Bhc (Lindane)	58-89-9	0.1	mg/kg	<0.00173 U	<0.00172 U	<0.000714 U	NA	<0.000674 U	<0.000685 U	<0.000692 U	NA	<0.00173 U	<0.000704 U	NA	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
Gamma Chlordane (Trans)	5103-74-2	NS	mg/kg	NA	NA	<0.00214 U	NA	0.0007 J	0.00417	0.00696	NA	NA	0.00732	NA	NA	NA	NA	NA	NA	NA	NA
Gamma-Chlordane	5566-34-7	NS	mg/kg	<0.00173 U	<0.00172 U	NA	NA	NA	NA	NA	NA	<0.00173 U	NA	NA	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
Heptachlor	76-44-8	0.042	mg/kg	<0.00173 U	<0.00172 U	<0.000856 U	NA	<0.000808 U	<0.000822 U	<0.00083 U	NA	<0.00173 U	<0.000845 U	NA	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
Heptachlor Epoxide	1024-57-3	NS	mg/kg	<0.00173 U	<0.00172 U	<0.00321 U	NA	<0.00303 U	<0.00308 U	<0.00311 U	NA	<0.00173 U	<0.00317 U	NA	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
Methoxychlor	72-43-5	NS	mg/kg	<0.00173 U	<0.00172 U	<0.00321 U	NA	<0.00303 U	<0.00308 U	<0.00311 U	NA	<0.00173 U	<0.00317 U	NA	<0.00176 U	NA	<0.00177 U	NA	<0.00186 U	<0.00181 U	<0.0018 U
Toxaphene	8001-35-2	NS	mg/kg	<0.173 U	<0.172 U	<0.0321 U	NA	<0.0303 U	<0.0308 U	<0.0311 U	NA	<0.173 U	<0.0317 U	NA	<0.176 U	NA	<0.177 U	NA	<0.186 U	<0.181 U	<0.18 U
Herbicides																					
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	mg/kg	<0.0205 U	<0.0209 U	<0.185 U	NA	<0.17 U	<0.173 U	<0.171 U	NA	<0.034 U	<0.178 U	NA	<0.0215 U	NA	<0.0214 U	NA	<0.0222 U	<0.0222 U	<0.0219 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	mg/kg	<0.0205 U	<0.0209 U	<0.185 U	NA	<0.17 U	<0.173 U	<0.171 U	NA	<0.034 U	<0.178 U	NA	<0.0215 U	NA	<0.0214 U	NA	<0.0222 U	<0.0222 U	<0.0219 U
Silvex (2,4,5-Tp)	93-72-1	3.8	mg/kg	<0.0205 U	<0.0209 U	<0.185 U	NA	<0.17 U	<0.173 U	<0.171 U	NA	<0.034 U	<0.178 U	NA	<0.0215 U	NA	<0.0214 U	NA	<0.0222 U	<0.0222 U	<0.0219 U
Polychlorinated Biphenyl																					
PCB-1016 (Aroclor 1016)	12674-11-2	NS	mg/kg	<0.0173 U	<0.0174 U	<0.0545 U	NA	<0.0496 U	<0.052 U	<0.0515 U	NA	<0.0174 U	<0.0529 U	NA	<0.0133 U	NA	<0.0178 U	NA	<0.0188 U	<0.0183 UJ	<0.0182 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	mg/kg	<0.0173 U	<0.0174 U	<0.0545 U	NA	<0.0496 U	<0.052 U	<0.0515 U	NA	<0.0174 U	<0.0529 U	NA	<0.0133 U	NA	<0.0178 U	NA	<0.0188 U	<0.0183 UJ	<0.0182 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	mg/kg	<0.0173 U	<0.0174 U	<0.0545 U	NA	<0.0496 U	<0.052 U	<0.0515 U	NA	<0.0174 U	<0.0529 U	NA	<0.0133 U	NA	<0.0178 U	NA	<0.0188 U	<0.0183 UJ	<0.0182 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	mg/kg	<0.0173 U	<0.0174 U	<0.0545 U	NA	<0.0496 U	<0.052 U	<0.0515 U	NA	<0.0174 U	<0.0529 U	NA	<0.0133 U	NA	<0.0178 U	NA	<0.0188 U	<0.0183 UJ	<0.0182 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	mg/kg	<0.0173 U	<0.0174 U	<0.0545 U	NA	<0.0496 U	<0.052 U	<0.0515 U	NA	<0.0174 U	<0.0529 U	NA	<0.0133 U	NA	<0.0178 U	NA	<0.0188 U	<0.0183 UJ	<0.0182 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	mg/kg	<0.0173 U	<0.0174 U	<0.0545 U	NA	<0.0496 U	0.0068 J	0.0111 J	NA	<0.0174 U	<0.0529 U	NA	<0.0133 U	NA	<0.0178 U	NA	<0.0188 U	<0.0183 UJ	<0.0182 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	mg/kg	<0.0173 U	<0.0174 U	<0.0545 U	NA	<0.0496 U	<0.052 U	<0.0515 U	NA	<0.0174 U	<0.0529 U	NA	0.0182	NA	<0.0178 U	NA	<0.0188 U	<0.0183 UJ	<0.0182 U
PCB-1262 (Aroclor 1262)	37324-23-5	NS	mg/kg	NA	NA	<0.0545 U	NA	<0.0496 U	<0.052 U	<0.0515 U	NA	NA	<0.0529 U	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1268 (Aroclor 1268)	11100-14-4	NS	mg/kg	NA	NA	<0.0545 U	NA	<0.0496 U	<0.052 U	<0.0515 U	NA	NA	<0.0529 U	NA	NA	NA	NA	NA	NA	NA	NA
Total PCBs	1336-36-3	0.1	mg/kg	<0.0173 U	<0.0174 U	<0.0545 U	NA	<0.0496 U	0.0068 J	0.0111 J	NA	<0.0174 U	<0.0529 U	NA	0.0182	NA	<0.0178 U	NA	<0.0188 U	<0.0183 UJ	<0.0182 U
Metals																					
Aluminum	7429-90-5	NS	mg/kg	587	722	408	NA	538	1,390 J	1,920	NA	4,000	1,870	NA	1,050	NA	2,500	NA	771	916	715
Antimony	7440-36-0	NS	mg/kg	<2.18 U	<2.19 UJ	<4.38 U	NA	<4.11 U	<4.15 UJ	<4.1 U	NA	<2.19 U	<4.47 U	NA	<2.25 U	NA	<2.24 U	NA	<2.37 U	<2.31 U	<2.29 U
Arsenic	7440-38-2	13	mg/kg	<1.31 U	2.93 J	0.823 J	NA	0.856	2.06	2.17	NA	2.47	2.14	NA	1.72	NA	3.41	NA	<1.42 U	1.63	<1.38 U
Barium	7440-39-3	**350**	mg/kg	4.24	3.85	7.98	NA	15.6	95.4 J	73.1	NA	28.2	66.1	NA	17.6	NA	96.9	NA	5.65	7.46	6.41
Beryllium	7440-41-7	7.2	mg/kg	<0.044 U	<0.044 U	<0.438 U	NA	<0.411 U	0.076 J	0.099 J	NA	<0.044 U	0.095 J	NA	<0.045 U	NA	<0.045 U	NA	<0.048 U	<0.047 U	<0.046 U
Cadmium	7440-43-9	2.5	mg/kg	<0.262 U	<0.263 U	<0.876 U	NA	<0.822 U	<0.83 U	0.268 J	NA	<0.262 U	0.056 J	NA	<0.27 U	NA	<0.269 U	NA	<0.284 U	<0.278 U	<0.275 U
Calcium	7440-70-2	NS	mg/kg	429	763 UJ	538	NA	4,040	39,400 J	8,730 J	NA	12,800	8,970	NA	829	NA	2,070	NA	531	718	362
Chromium, Hexavalent	18540-29-9	**1**	mg/kg	<0.524 U	<0.525 U	0.496 J	NA	<0.832 U	0.24 J	<0.833 U	NA	<0.525 UJ	<0.876 U	NA	<0.54 U	NA	<0.539 U	NA	<0.569 U	<0.556 U	<0.55 U
Chromium, Total	7440-47-3	NS	mg/kg	3.73	8.57 J	2.66	NA	2.36	4.94 J	6.88	NA	15.9	5.49	NA	4.99	NA	8.51	NA	4.05	5.7	3.07
Chromium, Trivalent	16065-83-1	30	mg/kg	3.32	8.57	2.16 J	NA	2.36	4.7 J	6.88	NA	15.9	5.49	NA	4.99	NA	8.51	NA	4.05	5.7	3.07
Cobalt	7440-48-4	NS	mg/kg	0.777	0.998	0.354 J	NA	0.488 J	1.15 J	1.56 J	NA	4.4	1.48 J	NA	0.711	NA	1.92	NA	0.692	0.889	0.587
Copper	7440-50-8	50	mg/kg	<1.75 U	<1.75 U	1.37	NA	2.98	34.3 J	30.6	NA	8.91	9.4	NA	5.26	NA	17.5	NA	<1.9 U	<1.85 U	<1.84 U
Cyanide	57-12-5	27	mg/kg	<0.524 U	<0.525 UJ	<1 U	NA	<0.96 U	0.42 J	0.26 J	NA	<0.525 UJ	<1.1 U	NA	<0.54 U	NA	0.614	NA	<0.569 U	<0.556 U	<0.55 U
Iron	7439-89-6	NS	mg/kg	1,680	2,780	1,320	NA	1,370	4,150 J	6,190	NA	7,320	4,350	NA	1,510	NA	3,200	NA	1,140	1,510	977
Lead	7439-92-1	**63**	mg/kg	1.88	4.99	5.23	NA	31.8	**257 J**	**142 J**	13.6	11.6	**67.8**	1.04	**89.2**	1.22	**257**	1.98	2.47	3.61	6.6
Magnesium	7439-95-4	NS	mg/kg	229	247 J	251	NA	2,110	21,300 J	1,600 J	NA	3,540	1,330	NA	298	NA	614	NA	269	338	261
Manganese	7439-96-5	1600	mg/kg	40.8	84.5 J	23.4	NA	30	70.6 J	70.9	NA	115	78.3	NA	37.4	NA	87.5	NA	29.3	41.1	17.2
Mercury	7439-97-6	**0.18**	mg/kg	<0.0314 U	<0.0315 U	<0.092 U	NA	<0.084 U	0.094	0.106	NA	<0.0315 U	0.101	NA	0.0922	NA	**0.248**	<0.0383 U	<0.0341 U	<0.0333 U	<0.033 U
Nickel	7440-02-0	30	mg/kg	1.21	1.48	1.32 J	NA	1.49 J	3.42 J	5.68	NA	8.64	4.1	NA	1.75	NA	5.59	NA	<0.944 U	1.03	1.05
Potassium	7440-09-7	NS	mg/kg	101	101 J	76.8 J	NA	93.2 J	248 J	346	NA	863	269	NA	172	NA	293	NA	180	191	181
Selenium	7782-49-2	3.9	mg/kg	<2.18 U	<2.19 UJ	<1.75 U	NA	<1.64 U	<1.66 U	<1.64 U	NA	<2.19 U	<1.79 U	NA	<2.25 U	NA	<2.24 U	NA	<2.37 U	<2.31 U	<2.29 U
Silver	7440-22-4	2	mg/kg	<0.44 U	<0.441 U	<0.438 U	NA	<0.411 U	<0.415 U	<0.41 U	NA	<0.441 U	<0.447 U	NA	<0.454 U	NA	<0.452 U	NA	<0.478 U	<0.467 U	<0.462 U
Sodium	7440-23-5	NS	mg/kg	<43.6 U	<43.8 U	<175 U	NA	<164 U	107 J	105 J	NA	417	<179 U	NA	57.9	NA	79.6	NA	60.2	85.7	47.6
Thallium	7440-28-0	NS	mg/kg	<1.75 U	<1.75 U	<1.75 U	NA	<1.64 U	<1.66 U	<1.64 U	NA	<1.75 U	<1.79 U	NA	<1.8 U	NA	<1.8 U	NA	<1.9 U	<1.86 U	<1.84 U
Vanadium	7440-62-2	NS	mg/kg	4.91	9.68 J	3.11	NA	2.47	5.89	6.9	NA	15	6.83	NA	4.08	NA	8.36	NA	4.05	5.43	2.95
Zinc	7440-66-6	**109**	mg/kg	3.72	4.59	18.2	NA	33	97.4 J	**169 J**	6.67	33.8	67.2	NA	32	NA	**142**	31.5	17.1	38.6	17.1
General Chemistry																					
Solids, Percent	SOLID	NS	Percent	95.5	95.2	88.7	95.7	96.1	95.8	96	92.9	95.3	91.3	94.9	92.6	95.6	92.8	86.1	87.9	90	90.8

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EPSW06	EPSW07	EPSW08	EPSW09	EPSW10	EPSW14	EPSW15	EPSW16	EPSW18	EPSW18	EPSW19	EPSW20	EPSW21	EPSW22	EPSW22	EPSW23	EPSW24	EPSW25	EPSW25
			Sample Name	EPSW06_EL1	EPSW07_EL1	EPSW08_EL1	EPSW09_EL1	EPSW10_EL1	EPSW14_EL3	EPSW15_EL3	EPSW16_EL3	EPSW18_EL3	EPSW18_EL2	EPSW19_EL3	EPSW20_EL3	EPSW21_EL1	EPSW22_EL3	EPSW22_EL1	EPSW23_EL3	EPSW24_EL3	EPSW25_EL3	DUP02_051525
			Sample Date	09/09/2025	09/09/2025	09/09/2025	09/10/2025	09/10/2025	04/22/2025	04/22/2025	04/16/2025	09/22/2025	09/25/2025	09/22/2025	09/22/2025	09/11/2025	08/27/2025	09/11/2025	05/15/2025	05/15/2025	05/15/2025	05/15/2025
			Sample Elevation	1	1	1	1	1	3	3	3	3	2	3	3	1	3	1	3	3	3	3
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																						
1,1,1,2-Tetrachloroethane	630-20-6	NS	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	<0.00052 U	<0.00053 U	<0.00051 U	<0.025 U	NA	<0.022 U	<0.023 U	NA	<0.0056 U	NA	<0.00057 U	<0.00054 U	<0.00056 U	<0.00057 U
1,1,1-Trichloroethane	71-55-6	0.68	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.00052 U	<0.00053 U	<0.00051 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.00057 U	<0.00054 U	<0.00056 U	<0.00057 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.00052 U	<0.00053 U	<0.00051 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.00057 U	<0.00054 U	<0.00056 U	<0.00057 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	NA	NA	NA	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	NA	NA	NA	NA
1,1,2-Trichloroethane	79-00-5	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
1,1-Dichloroethane	75-34-3	0.27	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
1,1-Dichloroethene	75-35-4	0.33	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0011 U	<0.0011 UJ	<0.0011 UJ	<0.0011 UJ
1,1-Dichloropropene	563-58-6	NS	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	<0.00052 U	<0.00053 U	<0.00051 U	NA	NA	NA	NA	NA	NA	NA	<0.00057 U	<0.00054 U	<0.00056 U	<0.00057 U
1,2,3-Trichlorobenzene	87-61-6	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
1,2,3-Trichloropropane	96-18-4	NS	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	NA	<0.0056 U	NA	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
1,2,4,5-Tetramethylbenzene	95-93-2	NS	mg/kg	NA	NA	NA	NA	NA	<0.0021 U	<0.0021 U	<0.002 U	NA	NA	NA	NA	NA	NA	NA	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
1,2,4-Trichlorobenzene	120-82-1	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
1,2,4-Trimethylbenzene	95-63-6	3.6	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0031 U	<0.0032 U	<0.003 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0034 U	<0.0032 U	<0.0034 U	<0.0034 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
1,2-Dichlorobenzene	95-50-1	1.1	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
1,2-Dichloroethane	107-06-2	0.02	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
1,2-Dichloropropane	78-87-5	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0021 UJ	<0.0021 UJ	<0.002 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
1,3-Dichlorobenzene	541-73-1	2.4	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
1,3-Dichloropropane	142-28-9	NS	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	NA	NA	NA	NA	NA	NA	NA	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
1,4-Dichlorobenzene	106-46-7	1.8	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
1,4-Diethyl Benzene	105-05-5	NS	mg/kg	NA	NA	NA	NA	NA	<0.0021 U	<0.0021 U	<0.002 U	NA	NA	NA	NA	NA	NA	NA	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	mg/kg	<0.067 U	<0.07 U	<0.064 U	NA	NA	<0.083 U	<0.084 U	<0.081 U	NA	NA	NA	NA	<0.13 U	NA	<0.12 U	<0.092 U	<0.086 U	<0.089 U	<0.091 U
2,2-Dichloropropane	594-20-7	NS	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	NA	NA	NA	NA	NA	NA	NA	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
2-Chlorotoluene	95-49-8	NS	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	NA	NA	NA	NA	NA	NA	NA	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
2-Hexanone (MBK)	591-78-6	NS	mg/kg	<0.022 U	<0.023 U	<0.021 U	<0.07 U	<0.025 U	<0.01 U	<0.01 U	<0.01 U	<0.031 U	NA	<0.028 U	<0.028 U	<0.043 U	<0.0056 U	<0.039 U	<0.011 U	<0.011 U	<0.011 U	<0.011 U
4-Chlorotoluene	106-43-4	NS	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	NA	NA	NA	NA	NA	NA	NA	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
4-Ethyltoluene	622-96-8	NS	mg/kg	NA	NA	NA	NA	NA	<0.0021 U	<0.0021 U	<0.002 U	NA	NA	NA	NA	NA	NA	NA	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
Acetone	67-64-1	**0.05**	mg/kg	<0.022 U	<0.023 U	<0.021 U	<0.05 U	<0.025 U	<0.01 U	<0.01 U	<0.01 U	<0.062 U	NA	<0.056 U	<0.056 U	<0.043 U	0.022 J	<0.039 U	<0.011 U	<0.011 U	<0.011 U	<0.011 U
Acrolein	107-02-8	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	<0.0062 U	NA	<0.0056 U	<0.0056 U	NA	<0.011 U	NA	NA	NA	NA	NA
Acrylonitrile	107-13-1	NS	mg/kg	NA	NA	NA	<0.028 U	<0.0098 U	<0.0041 U	<0.0042 U	<0.004 U	<0.025 U	NA	<0.022 U	<0.023 U	NA	<0.0056 U	NA	<0.0046 U	<0.0043 U	<0.0045 U	<0.0045 U
Benzene	71-43-2	0.06	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.00052 U	<0.00053 U	<0.00051 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.00057 U	<0.00054 U	<0.00056 U	<0.00057 U
Bromobenzene	108-86-1	NS	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	NA	NA	NA	NA	NA	NA	NA	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
Bromochloromethane	74-97-5	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
Bromodichloromethane	75-27-4	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.00052 U	<0.00053 U	<0.00051 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.00057 U	<0.00054 U	<0.00056 U	<0.00057 U
Bromoform	75-25-2	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0041 U	<0.0042 U	<0.004 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0046 U	<0.0043 U	<0.0045 U	<0.0045 U
Bromomethane	74-83-9	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
Carbon Disulfide	75-15-0	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.01 U	<0.01 U	<0.01 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.011 U	<0.011 U	<0.011 U	<0.011 U
Carbon Tetrachloride	56-23-5	0.76	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
Chlorobenzene	108-90-7	1.1	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.00052 U	<0.00053 U	<0.00051 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.00057 U	<0.00054 U	<0.00056 U	<0.00057 U
Chloroethane	75-00-3	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
Chloroform	67-66-3	0.37	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0015 U	<0.0016 U	<0.0015 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0017 U	<0.0016 U	<0.0017 U	<0.0017 U
Chloromethane	74-87-3	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0041 U	<0.0042 U	<0.004 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0046 U	<0.0043 U	<0.0045 U	<0.0045 U
Cis-1,2-Dichloroethene	156-59-2	0.25	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
Cis-1,3-Dichloropropene	10061-01-5	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.00052 U	<0.00053 U	<0.00051 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.00057 U	<0.00054 U	<0.00056 U	<0.00057 U
Cyclohexane	110-82-7	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	NA	NA	NA	NA	NA	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	NA	NA	NA	NA
Cymene	99-87-6	NS	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	NA	<0.0056 U	NA	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
Dibromochloromethane	124-48-1	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
Dibromomethane	74-95-3	NS	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	NA	<0.0056 U	NA	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
Dichlorodifluoromethane	75-71-8	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.01 U	<0.01 U	<0.01 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.011 U	<0.011 U	<0.011 U	<0.011 U
Diethyl Ether (Ethyl Ether)	60-29-7	NS	mg/kg	NA	NA	NA	NA	NA	<0.0021 U	<0.0021 U	<0.002 U	NA	NA	NA	NA	NA	NA	NA	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
Ethylbenzene	100-41-4	1	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
Hexachlorobutadiene	87-68-3	NS	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	<0.0041 U	<0.0042 U	<0.004 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	NA	<0.0056 U	NA	<0.0046 U	<0.0043 U	<0.0045 U	<0.0045 U
Isopropylbenzene (Cumene)	98-82-8	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
M,P-Xylene	179601-23-1	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.011 U	<0.0077 U	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
Methyl Acetate	79-20-9	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	NA	NA	NA	NA	NA	<0.062 U	NA	<0.056 U	<0.056 U	<0.0085 U	<0.0056 U	<0.0077 U	NA	NA	NA	NA
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	mg/kg	<0.027 U	<0.028 U	<0.026 U	<0.083 U	<0.029 U	<0.01 U	<0.01 U	<0.01 UJ	<0.037 U	NA	<0.034 U	<0.034 U	<0.051 U	<0.0056 U	<0.046 U	<0.011 U	<0.011 U	<0.011 U	<0.011 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	mg/kg	<0.022 U	<0.023 U	<0.021 U	<0.07 U	<0.025 U	<0.01 U	<0.01 U	<0.01 U	<0.031 U	NA	<0.028 U	<0.028 U	<0.043 U	<0.0056 U	<0.039 U	<0.011 U	<0.011 U	<0.011 U	<0.011 U
Methylcyclohexane	108-87-2	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	NA	NA	NA	NA	NA	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	NA	NA	NA	NA
Methylene Chloride	75-09-2	0.05	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0052 U	<0.0053 U	<0.0051 U	<0.031 U	NA	<0.028 U	<0.028 U	<0.0085 U	<0.011 U	<0.0077 U	<0.0057 U	<0.0054 U	<0.0056 U	<0.0057 U
Naphthalene	91-20-3	12	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	<0.0041 U	<0.0042 U	<0.004 U	NA	NA	NA	NA	NA	NA	NA	<0.0046 U	<0.0043 U	<0.0045 U	<0.0045 U
n-Butylbenzene	104-51-8	12	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	NA	<0.0056 U	NA	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
n-Propylbenzene	103-65-1	3.9	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	NA	<0.0056 U	NA	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
o-Cymene (O-Isopropyltoluene)	527-84-4	NS	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
Sec-Butylbenzene	135-98-8	11	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	NA	<0.0056 U	NA	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
Styrene	100-42-5	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
T-Butylbenzene	98-06-6	5.9	mg/kg	NA	NA	NA	<0.014 U	<0.0049 U	<0.0021 U	<0.0021 U	<0.002 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	NA	<0.0056 U	NA	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
Tert-Butyl Alcohol	75-65-0	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	<0.12 U	NA	<0.11 U	<0.11 U	NA	<0.028 U	NA	NA	NA	NA	NA
Tert-Butyl Methyl Ether (MTBE)	1634-04-4	0.93	mg/kg	<0.0089 U	<0.0093 U	<0.0085 U	<0.028 U	<0.0098 U	<0.0021 U	<0.0021 U	<0.002 U	<0.012 U	NA	<0.011 U	<0.011 U	<0.017 U	<0.0056 U	<0.015 U	<0.0023 U	<0.0021 U	<0.0022 U	<0.0023 U
Tetrachloroethene (PCE)	127-18-4	1.3	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.00052 U	0.00036 J	<0.00051 U	0.005 J	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	0.0018 J	<0.00057 U	<0.00054 U	<0.00056 U	<0.00057 U
Tetrahydrofuran	109-99-9	NS	mg/kg	NA	NA	NA	<0.028 U	<0.0098 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	108-88-3	0.7	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	mg/kg	NA	NA	NA	NA	NA	<0.001 U	<0.001 U	<0.001 U	NA	NA	NA	NA	NA	NA	NA	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
Total Xylenes	1330-20-7	0.26	mg/kg	NA	NA	NA	NA	NA	<0.001 U	<0.001 U	<0.001 U	NA	NA	NA	NA	NA	<0.017 U	NA	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	NS	mg/kg	NA	NA	NA	NA	NA	<0.00052 U	<0.00053 U	<0.00051 U	NA	NA	NA	NA	NA	NA	NA	<0.00057 U	<0.00054 U	<0.00056 U	<0.00057 U
Trans-1,2-Dichloroethene	156-60-5	0.19	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0015 U	<0.0016 U	<0.0015 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0017 U	<0.0016 U	<0.0017 U	<0.0017 U
Trans-1,3-Dichloropropene	10061-02-6	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	mg/kg	NA	NA	NA	<0.028 U	<0.0098 U	<0.0052 U	<0.0053 U	<0.0051 U	<0.012 U	NA	<0.011 U	<0.011 U	NA	NA	NA	<0.0057 U	<0.0054 U	<0.0056 U	<0.0057 U
Trichloroethene (TCE)	79-01-6	0.47	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.00052 U	<0.00053 U	<0.00051 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.00057 U	<0.00054 U	<0.00056 U	<0.00057 U
Trichlorofluoromethane	75-69-4	NS	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.0041 U	<0.0042 U	<0.004 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0046 U	<0.0043 U	<0.0045 U	<0.0045 U
Vinyl Acetate	108-05-4	NS	mg/kg	NA	NA	NA	NA	NA	<0.01 U	<0.01 U	<0.01 UJ	NA	NA	NA	NA	NA	NA	NA	<0.011 U	<0.011 U	<0.011 U	<0.011 U
Vinyl Chloride	75-01-4	0.02	mg/kg	<0.0045 U	<0.0047 U	<0.0043 U	<0.014 U	<0.0049 U	<0.001 U	<0.001 U	<0.001 U	<0.0062 U	NA	<0.0056 U	<0.0056 U	<0.0085 U	<0.0056 U	<0.0077 U	<0.0011 U	<0.0011 U	<0.0011 U	<0.0011 U

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EPSW06	EPSW07	EPSW08	EPSW09	EPSW10	EPSW14	EPSW15	EPSW16	EPSW18	EPSW18	EPSW19	EPSW20	EPSW21	EPSW22	EPSW22	EPSW23	EPSW24	EPSW25	EPSW25
			Sample Name	EPSW06_EL1	EPSW07_EL1	EPSW08_EL1	EPSW09_EL1	EPSW10_EL1	EPSW14_EL3	EPSW15_EL3	EPSW16_EL3	EPSW18_EL3	EPSW18_EL2	EPSW19_EL3	EPSW20_EL3	EPSW21_EL1	EPSW22_EL3	EPSW22_EL1	EPSW23_EL3	EPSW24_EL3	EPSW25_EL3	DUP02_051525
			Sample Date	09/09/2025	09/09/2025	09/09/2025	09/10/2025	09/10/2025	04/22/2025	04/22/2025	04/16/2025	09/22/2025	09/25/2025	09/22/2025	09/22/2025	09/11/2025	08/27/2025	09/11/2025	05/15/2025	05/15/2025	05/15/2025	05/15/2025
			Sample Elevation	1	1	1	1	1	3	3	3	3	2	3	3	1	3	1	3	3	3	3
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																						
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	mg/kg	<0.214 U	<0.216 U	<0.427 U	<0.217 UJ	<0.179 UJ	<0.17 U	<0.17 U	<0.17 U	<0.184 U	NA	<0.169 U	<0.176 U	<0.195 U	<0.181 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
1,2,4-Trichlorobenzene	120-82-1	NS	mg/kg	NA	NA	NA	NA	NA	<0.17 U	<0.17 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
1,2-Dichlorobenzene	95-50-1	1.1	mg/kg	NA	NA	NA	NA	NA	<0.17 U	<0.17 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
1,2-Diphenylhydrazine	122-66-7	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	NA	NA	NA	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	541-73-1	2.4	mg/kg	NA	NA	NA	NA	NA	<0.17 U	<0.17 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
1,4-Dichlorobenzene	106-46-7	1.8	mg/kg	NA	NA	NA	NA	NA	<0.17 U	<0.17 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	mg/kg	<0.0198 U	<0.0198 U	<0.0349 U	<0.0356 U	<0.0194 U	<0.026 U	<0.026 U	<0.025 U	<0.0194 U	NA	<0.0194 U	<0.0194 U	<0.0198 U	<0.0198 U	NA	<0.026 U	<0.026 U	<0.026 U	<0.026 U
2,3,4,6-Tetrachlorophenol	58-90-2	NS	mg/kg	<0.214 U	<0.216 U	<0.427 U	<0.217 UJ	<0.179 UJ	NA	NA	NA	<0.184 U	NA	<0.169 U	<0.176 U	<0.195 U	<0.181 U	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	95-95-4	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
2,4,6-Trichlorophenol	88-06-2	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.1 U	<0.1 U	<0.1 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.1 U	<0.1 U	<0.1 U	<0.1 U
2,4-Dichlorophenol	120-83-2	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.16 U	<0.15 U	<0.15 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.16 U	<0.16 U	<0.16 U	<0.16 U
2,4-Dimethylphenol	105-67-9	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
2,4-Dinitrophenol	51-28-5	NS	mg/kg	<0.214 U	<0.216 U	<0.427 U	<0.217 UJ	<0.179 UJ	<0.83 U	<0.82 U	<0.8 U	<0.184 U	NA	<0.169 U	<0.176 U	<0.195 U	<0.181 UJ	NA	<0.83 U	<0.84 U	<0.84 U	<0.84 U
2,4-Dinitrotoluene	121-14-2	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
2,6-Dinitrotoluene	606-20-2	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
2-Chloronaphthalene	91-58-7	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
2-Chlorophenol	95-57-8	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
2-Methylnaphthalene	91-57-6	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.046 J	0.065 J	<0.2 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.21 U	0.023 J	<0.21 U	<0.21 U
2-Methylphenol (o-Cresol)	95-48-7	0.33	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
2-Nitroaniline	88-74-4	NS	mg/kg	<0.214 U	<0.216 U	<0.427 U	<0.217 UJ	<0.179 UJ	<0.17 U	<0.17 U	<0.17 U	<0.184 U	NA	<0.169 U	<0.176 U	<0.195 U	<0.181 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
2-Nitrophenol	88-75-5	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.38 U	<0.37 U	<0.36 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.37 U	<0.38 U	<0.38 U	<0.38 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.25 U	0.031 J	<0.24 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.25 U	<0.25 U	<0.25 U	<0.25 U
3,3'-Dichlorobenzidine	91-94-1	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 UJ	<0.18 UJ	<0.18 UJ	<0.18 UJ
3-Nitroaniline	99-09-2	NS	mg/kg	<0.214 U	<0.216 U	<0.427 U	<0.217 UJ	<0.179 UJ	<0.17 U	<0.17 U	<0.17 U	<0.184 U	NA	<0.169 U	<0.176 U	<0.195 U	<0.181 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	mg/kg	<0.214 U	<0.216 U	<0.427 U	<0.217 UJ	<0.179 UJ	<0.45 U	<0.44 U	<0.43 U	<0.184 U	NA	<0.169 U	<0.176 U	<0.195 U	<0.181 U	NA	<0.45 UJ	<0.46 UJ	<0.46 UJ	<0.46 UJ
4-Bromophenyl Phenyl Ether	101-55-3	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
4-Chloro-3-Methylphenol	59-50-7	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
4-Chloroaniline	106-47-8	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 UJ	<0.18 UJ	<0.18 UJ	<0.18 UJ
4-Nitroaniline	100-01-6	NS	mg/kg	<0.214 U	<0.216 U	<0.427 U	<0.217 UJ	<0.179 UJ	<0.17 U	<0.17 U	<0.17 U	<0.184 U	NA	<0.169 U	<0.176 U	<0.195 U	<0.181 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
4-Nitrophenol	100-02-7	NS	mg/kg	<0.214 U	<0.216 U	<0.427 U	<0.217 UJ	<0.179 UJ	<0.24 U	<0.24 U	<0.23 U	<0.184 U	NA	<0.169 U	<0.176 U	<0.195 U	<0.181 U	NA	<0.24 U	<0.24 U	<0.24 U	<0.24 U
Acenaphthene	83-32-9	20	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.076 J	0.15	0.039 J	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.14 U	0.066 J	<0.14 U	<0.14 U
Acenaphthylene	208-96-8	100	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.12 J	0.33	0.049 J	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.14 U	<0.14 U	<0.14 U	<0.14 U
Acetophenone	98-86-2	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
Aniline (Phenylamine, Aminobenzene)	62-53-3	NS	mg/kg	<0.43 U	<0.433 U	<0.855 U	<0.436 UJ	<0.36 UJ	NA	NA	NA	<0.368 U	NA	<0.34 U	<0.353 U	<0.39 U	<0.362 U	NA	NA	NA	NA	NA
Anthracene	120-12-7	100	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.21	0.59	0.11	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	0.0643 JD	NA	<0.1 U	0.15	<0.1 U	<0.1 U
Atrazine	1912-24-9	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	NA	NA	NA	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	NA	NA	NA	NA
Benzaldehyde	100-52-7	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	NA	NA	NA	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	NA	NA	NA	NA
Benzidine	92-87-5	NS	mg/kg	<0.43 U	<0.433 U	<0.855 U	<0.436 UJ	<0.36 UJ	NA	NA	NA	<0.368 U	NA	<0.34 U	<0.353 U	<0.39 U	<0.362 U	NA	NA	NA	NA	NA
Benzo(a)anthracene	56-55-3	**1**	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.67	**2.2**	0.37	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	0.228 D	NA	<0.1 UJ	0.26 J	0.029 J	<0.1 UJ
Benzo(a)pyrene	50-32-8	**1**	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.7	**2.1**	0.38	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	0.182 D	NA	<0.14 U	0.17	<0.14 U	<0.14 U
Benzo(b)fluoranthene	205-99-2	**1**	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.99	**2.5**	0.48	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	0.174 D	NA	<0.1 UJ	0.21 J	<0.1 UJ	<0.1 UJ
Benzo(g,h,i)Perylene	191-24-2	100	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.46	1.3	0.23	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	0.127 D	NA	<0.14 UJ	0.1 J	<0.14 UJ	<0.14 UJ
Benzo(k)fluoranthene	207-08-9	**0.8**	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.23	**0.9**	0.15	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	0.151 D	NA	<0.1 U	0.095 J	<0.1 U	<0.1 U
Benzoic Acid	65-85-0	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.56 U	<0.55 U	<0.54 U	<0.0919 UJ	NA	<0.0848 UJ	<0.0881 UJ	<0.0974 U	<0.0904 U	NA	<0.56 U	<0.57 U	<0.57 U	<0.57 U
Benzyl Alcohol	100-51-6	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
Benzyl Butyl Phthalate	85-68-7	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
Biphenyl (Diphenyl)	92-52-4	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.4 U	0.023 J	<0.38 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.4 U	<0.4 U	<0.4 U	<0.4 U
Bis(2-chloroethoxy) methane	111-91-1	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.19 U	<0.18 U	<0.18 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.19 U	<0.19 U	<0.19 U	<0.19 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.16 U	<0.15 U	<0.15 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.16 U	<0.16 U	<0.16 U	<0.16 U
Bis(2-chloroisopropyl) ether	108-60-1	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.21 U	<0.2 U	<0.2 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.21 U	<0.21 U	<0.21 U	<0.21 U
Bis(2-ethylhexyl) phthalate	117-81-7	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.084 J	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 UJ	15 J	<0.18 UJ	<0.18 UJ
Caprolactam	105-60-2	NS	mg/kg	<0.214 U	<0.216 U	<0.427 U	<0.217 UJ	<0.179 UJ	NA	NA	NA	<0.184 U	NA	<0.169 U	<0.176 U	<0.195 U	<0.181 U	NA	NA	NA	NA	NA
Carbazole	86-74-8	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.072 J	0.21	0.056 J	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 UJ	0.03 J	<0.18 UJ	<0.18 UJ
Chrysene	218-01-9	**1**	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.67	**1.9**	0.4	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	0.249 D	NA	<0.1 UJ	0.26 J	0.028 J	<0.1 UJ
Dibenz(a,h)anthracene	53-70-3	**0.33**	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.087 J	0.28	0.054 J	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.1 UJ	0.024 J	<0.1 UJ	<0.1 UJ
Dibenzofuran	132-64-9	7	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.058 J	0.097 J	0.02 J	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	0.067 J	<0.18 U	<0.18 U
Dibutyl phthalate	84-74-2	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 UJ	<0.18 UJ	<0.18 UJ	<0.18 UJ
Diethyl phthalate	84-66-2	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 UJ	<0.18 UJ	<0.18 UJ	<0.18 UJ
Dimethyl phthalate	131-11-3	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 UJ	<0.18 UJ	<0.18 UJ	<0.18 UJ
Dioctyl phthalate	117-84-0	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 UJ	<0.18 UJ	<0.18 UJ	<0.18 UJ
Diphenylamine	122-39-4	NS	mg/kg	<0.214 U	<0.216 U	<0.427 U	<0.217 UJ	<0.179 UJ	NA	NA	NA	<0.184 U	NA	<0.169 U	<0.176 U	<0.195 U	<0.181 U	NA	NA	NA	NA	NA
Fluoranthene	206-44-0	100	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	1.3	3.4	0.85	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	0.428 D	NA	<0.1 U	0.6	0.051 J	0.026 J
Fluorene	86-73-7	30	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.07 J	0.15 J	0.031 J	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	0.066 J	<0.18 U	<0.18 U
Hexachlorobenzene	118-74-1	0.33	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.1 U	<0.1 U	<0.1 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Hexachlorobutadiene	87-68-3	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 UJ	<0.18 UJ	<0.18 UJ	<0.18 UJ
Hexachlorocyclopentadiene	77-47-4	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.5 U	<0.49 U	<0.48 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.5 UJ	<0.5 UJ	<0.5 UJ	<0.5 UJ
Hexachloroethane	67-72-1	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.14 U	<0.14 U	<0.13 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.14 U	<0.14 U	<0.14 U	<0.14 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.39	**1.2**	0.23	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	0.106 D	NA	<0.14 UJ	0.1 J	<0.14 UJ	<0.14 UJ
Isophorone	78-59-1	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.16 U	<0.15 U	<0.15 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.16 U	<0.16 U	<0.16 U	<0.16 U
Naphthalene	91-20-3	12	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.088 J	0.37	0.04 J	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	0.028 J	<0.18 U	<0.18 U
Nitrobenzene	98-95-3	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.16 U	<0.15 U	<0.15 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.16 U	<0.16 U	<0.16 U	<0.16 U
n-Nitrosodimethylamine	62-75-9	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	NA	NA	NA	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	NA	NA	NA	NA
n-Nitrosodi-N-Propylamine	621-64-7	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
n-Nitrosodiphenylamine	86-30-6	NS	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.14 U	<0.14 U	<0.13 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.14 U	<0.14 U	<0.14 U	<0.14 U
Pentachlorophenol	87-86-5	0.8	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	<0.14 U	<0.14 U	<0.13 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.14 U	<0.14 U	<0.14 U	<0.14 U
Phenanthrene	85-01-8	100	mg/kg	<0.107 U	<0.108 U	<0.214 U	<0.109 UJ	<0.0898 UJ	0.82	2.2	0.52	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	0.314 D	NA	<0.1 U	0.75	0.033 J	<0.1 U
Phenol	108-95-2	0.33	mg/kg	<0.107 UJ	<0.108 UJ	<0.214 UJ	<0.109 UJ	<0.0898 UJ	<0.17 U	<0.17 U	<0.17 U	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	<0.0904 U	NA	<0.17 U	<0.18 U	<0.18 U	<0.18 U
Pyrene	129-00-0	100	mg/kg	<0.107 U	0.0717 JD	<0.214 U	<0.109 UJ	<0.0898 UJ	1.2	3.3	0.77	<0.0919 U	NA	<0.0848 U	<0.0881 U	<0.0974 U	0.651 D	NA	<0.1 U	0.6	0.054 J	0.028 J
Pyridine	110-86-1	NS	mg/kg	<0.43 U	<0.433 U	<0.855 U	<0.436 UJ	<0.36 UJ	NA	NA	NA	<0.368 U	NA	<0.34 U	<0.353 U	<0.39 U	<0.362 U	NA	NA	NA	NA	NA

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EPSW06	EPSW07	EPSW08	EPSW09	EPSW10	EPSW14	EPSW15	EPSW16	EPSW18	EPSW18	EPSW19	EPSW20	EPSW21	EPSW22	EPSW22	EPSW23	EPSW24	EPSW25	EPSW25
			Sample Name	EPSW06_EL1	EPSW07_EL1	EPSW08_EL1	EPSW09_EL1	EPSW10_EL1	EPSW14_EL3	EPSW15_EL3	EPSW16_EL3	EPSW18_EL3	EPSW18_EL2	EPSW19_EL3	EPSW20_EL3	EPSW21_EL1	EPSW22_EL3	EPSW22_EL1	EPSW23_EL3	EPSW24_EL3	EPSW25_EL3	DUP02_051525
			Sample Date	09/09/2025	09/09/2025	09/09/2025	09/10/2025	09/10/2025	04/22/2025	04/22/2025	04/16/2025	09/22/2025	09/25/2025	09/22/2025	09/22/2025	09/11/2025	08/27/2025	09/11/2025	05/15/2025	05/15/2025	05/15/2025	05/15/2025
			Sample Elevation	1	1	1	1	1	3	3	3	3	2	3	3	1	3	1	3	3	3	3
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																						
4,4'-DDD	72-54-8	**0.0033**	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	0.000802 J	**0.0054**	<0.00158 U	**0.00616**	<0.000391 U	<0.000336 U	<0.000348 U	<0.00197 U	**0.0156 J**	<0.00191 U	<0.00166 U	<0.00159 U	<0.00164 U	<0.00167 U
4,4'-DDE	72-55-9	**0.0033**	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	0.0013 J	**0.0515**	<0.00158 U	0.000458	NA	<0.000336 U	<0.000348 U	<0.00197 U	**0.00739 J**	<0.00191 U	<0.00166 U	<0.00159 U	<0.00164 U	<0.00167 U
4,4'-DDT	50-29-3	**0.0033**	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	**0.00386**	**0.165**	<0.00158 U	**0.00424**	<0.000391 U	0.00175	<0.000348 U	<0.00197 U	**0.0199 J**	<0.00191 U	<0.00166 U	<0.00159 U	<0.00164 U	<0.00167 U
Aldrin	309-00-2	0.005	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	<0.00164 U	<0.00159 UJ	<0.00158 U	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	<0.00181 UJ	NA	<0.00166 U	<0.00159 U	<0.00164 U	<0.00167 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	<0.000682 U	<0.000664 UJ	<0.00066 U	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	<0.00181 UJ	NA	<0.000693 U	<0.000663 U	<0.000682 U	<0.000696 U
Alpha Chlordane	5103-71-9	0.094	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	0.00732	0.00528 J	0.000958 J	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	<0.00181 UJ	NA	<0.00208 U	<0.00199 U	<0.00204 U	<0.00209 U
Alpha Endosulfan	959-98-8	2.4	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	<0.00164 U	<0.00159 UJ	<0.00158 U	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	<0.00181 UJ	NA	<0.00166 U	<0.00159 U	<0.00164 U	<0.00167 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	<0.00164 U	<0.00159 UJ	<0.00158 U	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	<0.00181 UJ	NA	<0.00166 U	<0.00159 U	<0.00164 U	<0.00167 U
Beta Endosulfan	33213-65-9	2.4	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	<0.00164 U	<0.00159 UJ	<0.00158 U	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	<0.00181 UJ	NA	<0.00166 U	<0.00159 U	<0.00164 U	<0.00167 U
Chlordane (alpha and gamma)	57-74-9	NS	mg/kg	<0.00844 U	<0.0165 U	<0.0176 U	<0.0162 U	<0.0354 U	0.0294	0.0229	<0.0132 U	<0.00727 U	NA	<0.00671 U	<0.00697 U	<0.0393 U	<0.0361 UJ	NA	<0.0139 U	<0.0133 U	<0.0136 U	<0.0139 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	<0.00164 U	<0.00159 UJ	<0.00158 U	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	<0.00181 UJ	NA	<0.00166 U	<0.00159 U	<0.00164 U	<0.00167 U
Dieldrin	60-57-1	**0.005**	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	<0.00102 U	**0.00797**	<0.000991 U	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	<0.00181 UJ	NA	<0.00104 U	<0.000995 U	<0.00102 U	<0.00104 U
Endosulfan Sulfate	1031-07-8	2.4	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	<0.000682 U	<0.000664 UJ	<0.00066 U	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	<0.00181 UJ	NA	<0.000693 U	<0.000663 U	<0.000682 U	<0.000696 U
Endrin	72-20-8	0.014	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	<0.000682 U	<0.000664 UJ	<0.00066 U	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	<0.00181 UJ	NA	<0.000693 U	<0.000663 U	<0.000682 U	<0.000696 U
Endrin Aldehyde	7421-93-4	NS	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	<0.00205 U	<0.00199 UJ	<0.00198 U	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	<0.00181 UJ	NA	<0.00208 U	<0.00199 U	<0.00204 U	<0.00209 U
Endrin Ketone	53494-70-5	NS	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	<0.00164 U	<0.00159 UJ	<0.00158 U	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	<0.00181 UJ	NA	<0.00166 U	<0.00159 U	<0.00164 U	<0.00167 U
Gamma Bhc (Lindane)	58-89-9	0.1	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	<0.000682 U	<0.000664 UJ	<0.00066 U	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	<0.00181 UJ	NA	<0.000693 U	<0.000663 U	<0.000682 U	<0.000696 U
Gamma Chlordane (Trans)	5103-74-2	NS	mg/kg	NA	NA	NA	NA	NA	0.00331 J	0.00485 J	0.000816 J	NA	NA	NA	NA	NA	NA	NA	<0.00208 U	<0.00199 U	<0.00204 U	<0.00209 U
Gamma-Chlordane	5566-34-7	NS	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	NA	NA	NA	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	0.00185 J	NA	NA	NA	NA	NA
Heptachlor	76-44-8	0.042	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	<0.000819 U	<0.000797 UJ	<0.000792 U	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	<0.00181 UJ	NA	<0.000832 U	<0.000796 U	<0.000818 U	<0.000835 U
Heptachlor Epoxide	1024-57-3	NS	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	<0.00307 U	<0.00299 U	<0.00297 U	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	<0.00181 UJ	NA	<0.00312 U	<0.00298 U	<0.00307 U	<0.00313 U
Methoxychlor	72-43-5	NS	mg/kg	<0.000422 U	<0.000825 U	<0.000879 U	<0.000811 U	<0.00177 U	<0.00307 U	<0.00299 UJ	<0.00297 U	<0.000364 U	NA	<0.000336 U	<0.000348 U	<0.00197 U	<0.00181 UJ	NA	<0.00312 U	<0.00298 U	<0.00307 U	<0.00313 U
Toxaphene	8001-35-2	NS	mg/kg	<0.0422 U	<0.0825 U	<0.0879 U	<0.0811 U	<0.177 U	<0.0307 U	<0.0299 UJ	<0.0297 U	<0.0364 U	NA	<0.0336 U	<0.0348 U	<0.197 U	<0.181 UJ	NA	<0.0312 U	<0.0298 U	<0.0307 U	<0.0313 U
Herbicides																						
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	mg/kg	<0.0251 U	<0.0257 U	<0.0266 U	<0.0517 U	<0.0212 U	<0.171 U	<0.17 U	<0.169 U	<0.022 U	NA	<0.0205 U	<0.0213 U	<0.0237 U	<0.022 U	NA	<0.171 U	<0.174 U	<0.173 U	<0.173 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	mg/kg	<0.0251 U	<0.0257 U	<0.0266 U	<0.0517 U	<0.0212 U	<0.171 U	<0.17 U	<0.169 U	<0.022 U	NA	<0.0205 U	<0.0213 U	<0.0237 U	<0.022 U	NA	<0.171 U	<0.174 U	<0.173 U	<0.173 U
Silvex (2,4,5-Tp)	93-72-1	3.8	mg/kg	<0.0251 U	<0.0257 U	<0.0266 U	<0.0517 U	<0.0212 U	<0.171 U	<0.17 U	<0.169 U	<0.022 U	NA	<0.0205 U	<0.0213 U	<0.0237 U	<0.022 U	NA	<0.171 U	<0.174 U	<0.173 U	<0.173 U
Polychlorinated Biphenyl																						
PCB-1016 (Aroclor 1016)	12674-11-2	NS	mg/kg	<0.0213 U	<0.0416 U	<0.0444 U	<0.0409 U	<0.0179 U	<0.05 U	<0.0509 U	<0.0486 U	<0.0183 UJ	NA	<0.0169 UJ	<0.0176 U	<0.0199 U	<0.0182 U	NA	<0.0525 U	<0.052 U	<0.05 U	<0.0516 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	mg/kg	<0.0213 U	<0.0416 U	<0.0444 U	<0.0409 U	<0.0179 U	<0.05 U	<0.0509 U	<0.0486 U	<0.0183 UJ	NA	<0.0169 UJ	<0.0176 U	<0.0199 U	<0.0182 U	NA	<0.0525 U	<0.052 U	<0.05 U	<0.0516 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	mg/kg	<0.0213 U	<0.0416 U	<0.0444 U	<0.0409 U	<0.0179 U	<0.05 U	<0.0509 U	<0.0486 U	<0.0183 UJ	NA	<0.0169 UJ	<0.0176 U	<0.0199 U	<0.0182 U	NA	<0.0525 U	<0.052 U	<0.05 U	<0.0516 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	mg/kg	<0.0213 U	<0.0416 U	<0.0444 U	<0.0409 U	<0.0179 U	<0.05 U	<0.0509 U	<0.0486 U	<0.0183 UJ	NA	<0.0169 UJ	<0.0176 U	<0.0199 U	<0.0182 U	NA	<0.0525 U	<0.052 U	<0.05 U	<0.0516 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	mg/kg	<0.0213 U	<0.0416 U	<0.0444 U	<0.0409 U	<0.0179 U	<0.05 U	<0.0509 U	<0.0486 U	<0.0183 UJ	NA	<0.0169 UJ	<0.0176 U	<0.0199 U	<0.0182 U	NA	<0.0525 U	<0.052 U	<0.05 U	<0.0516 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	mg/kg	<0.0213 U	<0.0416 U	<0.0444 U	<0.0409 U	<0.0179 U	<0.05 U	<0.0509 U	<0.0486 U	<0.0183 UJ	NA	<0.0169 UJ	<0.0176 U	<0.0199 U	<0.0182 U	NA	<0.0525 U	<0.052 U	<0.05 U	<0.0516 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	mg/kg	<0.0213 U	<0.0416 U	<0.0444 U	<0.0409 U	<0.0179 U	0.0159 J	0.0212 J	<0.0486 U	<0.0183 UJ	NA	<0.0169 UJ	<0.0176 U	<0.0199 U	<0.0182 U	NA	<0.0525 U	<0.052 U	<0.05 U	<0.0516 U
PCB-1262 (Aroclor 1262)	37324-23-5	NS	mg/kg	NA	NA	NA	NA	NA	<0.05 U	<0.0509 U	<0.0486 U	NA	NA	NA	NA	NA	NA	NA	<0.0525 U	<0.052 U	<0.05 U	<0.0516 U
PCB-1268 (Aroclor 1268)	11100-14-4	NS	mg/kg	NA	NA	NA	NA	NA	<0.05 U	<0.0509 U	<0.0486 U	NA	NA	NA	NA	NA	NA	NA	<0.0525 U	<0.052 U	<0.05 U	<0.0516 U
Total PCBs	1336-36-3	0.1	mg/kg	<0.0213 U	<0.0416 U	<0.0444 U	<0.0409 U	<0.0179 U	0.0159 J	0.0212 J	<0.0486 U	<0.0183 UJ	NA	<0.0169 UJ	<0.0176 U	<0.0199 U	<0.0182 U	NA	<0.0525 U	<0.052 U	<0.05 U	<0.0516 U
Metals																						
Aluminum	7429-90-5	NS	mg/kg	624	535	817	475	659	2,220	1,560	908	800	NA	563	672 J	636	1,380	NA	199	212	286	244
Antimony	7440-36-0	NS	mg/kg	<2.69 U	<2.71 U	<2.79 U	<2.73 U	<2.24 U	<4.03 U	<4.03 U	<3.91 U	<2.32 U	NA	<2.14 U	<2.22 UJ	<2.49 U	<2.29 U	NA	<3.99 U	<4.16 U	<4.05 U	<4.12 U
Arsenic	7440-38-2	13	mg/kg	<1.61 U	<1.62 U	<1.67 U	<1.64 U	<1.35 U	3.16	3.11	1.8	<1.39 U	NA	<1.28 U	<1.33 U	<1.49 U	1.58	NA	<0.797 U	<0.831 U	<0.81 U	0.529 J
Barium	7440-39-3	**350**	mg/kg	5.24	5.02	8.21	<2.72 U	3.99	54.1	107	20.5	3.61	NA	5.42	4.06	3.98	**906**	7.91	2.17	3.9	3.71	2.9
Beryllium	7440-41-7	7.2	mg/kg	<0.054 U	<0.055 U	<0.056 U	<0.055 U	<0.045 U	0.149 J	0.126 J	0.083 J	<0.047 U	NA	<0.043 U	<0.045 U	<0.05 U	<0.046 U	NA	<0.399 U	<0.416 U	<0.405 U	<0.412 U
Cadmium	7440-43-9	2.5	mg/kg	<0.323 U	<0.325 U	<0.335 U	<0.327 U	<0.269 U	<0.806 U	1.37	0.12 J	<0.278 U	NA	<0.257 U	<0.267 U	<0.299 U	0.65	NA	0.047 J	<0.831 U	<0.81 U	<0.824 U
Calcium	7440-70-2	NS	mg/kg	618	372	555	237 J	349 J	45,200	7,820	4,930	435	NA	307	353 J	331	3,130	NA	220	268	378	254
Chromium, Hexavalent	18540-29-9	**1**	mg/kg	<0.646 U	<0.65 U	<0.67 U	0.725	<0.538 U	<0.843 U	<0.833 U	<0.82 U	<0.556 U	NA	<0.514 UJ	<0.533 U	<0.598 U	<0.549 U	<0.591 U	<0.842 U	<0.846 U	0.296 J	<0.847 U
Chromium, Total	7440-47-3	NS	mg/kg	2.83	2.58	5.01	1.83	2.79	9.5	4.92	5.91	3.95	NA	2.53	3.27	2.85	5.17	NA	1.26	1.14	1.56	1.58
Chromium, Trivalent	16065-83-1	30	mg/kg	2.83	2.58	5.01	1.1	2.79	9.5	4.92	5.91	3.95	NA	2.53	3.27	2.85	5.17	NA	1.26	1.14	1.26 J	1.58
Cobalt	7440-48-4	NS	mg/kg	0.441	0.574	0.592	<0.436 U	0.422	8.5	1.9	0.813 J	0.501	NA	<0.342 U	0.471	0.488	1.5	NA	<1.59 U	0.235 J	0.32 J	0.304 J
Copper	7440-50-8	50	mg/kg	<2.15 U	<2.17 U	<2.23 U	<2.18 U	<1.79 U	37.2	16.2	5.11	<1.86 U	NA	<1.71 U	<1.78 U	<1.99 U	26.7	NA	0.818	0.484 J	0.546 J	0.841
Cyanide	57-12-5	27	mg/kg	<0.646 U	<0.65 U	<0.67 U	<0.655 U	<0.538 U	<0.97 UJ	<0.99 UJ	<0.95 U	<0.556 U	NA	<0.514 U	<0.533 U	<0.598 U	1.8	NA	<1 U	<1 U	<1 U	<1 U
Iron	7439-89-6	NS	mg/kg	785	666	1,160	575	947	5,520	3,490	2,780	1,200	NA	931	1,020	905	3,260	NA	562	538	757	679
Lead	7439-92-1	**63**	mg/kg	3.18	3.46	3.05	1.73	1.7	**91.3**	**299**	36.9	4.65	NA	15.4	1.7	1.61	**264**	2.96	6.72	4.98	5.68	3.03 J
Magnesium	7439-95-4	NS	mg/kg	214	171	276	133	227	22,900	1,540	1,060	282	NA	186	243	213	782	NA	84.1	107	134	110
Manganese	7439-96-5	1600	mg/kg	17.4	18.8	31.9	19.3	23.1	179	69.6	46.6	30.7	NA	19	20.5	19.7	50.5	NA	6.76	14.2	13.1	11.7
Mercury	7439-97-6	**0.18**	mg/kg	<0.0387 U	<0.039 U	<0.0402 U	0.103	<0.0323 U	0.105	0.154	<0.078 U	<0.0334 U	NA	<0.0308 U	<0.032 U	<0.0359 U	0.0731	NA	<0.07 U	<0.072 U	<0.082 U	<0.078 U
Nickel	7440-02-0	30	mg/kg	<1.07 U	<1.08 U	<1.11 U	<1.09 U	0.933	6.09	6.81	2.1	0.937	NA	<0.853 U	1.14	1.32	4.55	NA	<1.99 U	<2.08 U	0.859 J	0.722 J
Potassium	7440-09-7	NS	mg/kg	129	122	166	109	144	394	196 J	114 J	141	NA	107	131	170	188	NA	43.9 J	49.6 J	66 J	59.2 J
Selenium	7782-49-2	3.9	mg/kg	<2.69 U	<2.71 U	<2.79 U	<2.73 U	<2.24 U	<1.61 U	<1.61 U	0.282 J	<2.32 U	NA	<2.14 U	<2.22 U	<2.49 U	<2.29 U	NA	<1.59 U	<1.66 U	<1.62 U	<1.65 U
Silver	7440-22-4	2	mg/kg	<0.542 U	<0.546 U	<0.563 U	<0.55 U	<0.452 U	<0.403 U	<0.403 U	<0.391 U	<0.467 U	NA	<0.432 U	<0.448 U	<0.502 U	<0.462 U	NA	<0.399 U	<0.416 U	<0.405 U	<0.412 U
Sodium	7440-23-5	NS	mg/kg	<53.8 U	55.2	<55.8 U	<54.6 U	77.9 J	129 J	120 J	<156 U	50.7	NA	<42.8 U	51.5	106	95	NA	<159 U	<166 U	<162 U	<165 U
Thallium	7440-28-0	NS	mg/kg	<2.16 U	<2.17 U	<2.24 U	<2.19 U	<1.8 U	<1.61 U	<1.61 U	1.02 J	<1.86 U	NA	<1.72 U	<1.78 U	<2 U	<1.84 U	NA	<1.59 U	<1.66 U	<1.62 U	<1.65 U
Vanadium	7440-62-2	NS	mg/kg	2.43	2.39	4.22	1.61	2.6	9.53	8.14	8.62	3.72	NA	2.33	2.73	2.57	7.36	NA	1.3	1.21	1.46	1.52
Zinc	7440-66-6	**109**	mg/kg	14.5	23.2	24.1	4.83	9.31	**172**	**305**	39.1	12.6	NA	6.36	13.6	11.5	**271**	34.2	6.55	7.74	8.77	7.11
General Chemistry																						
Solids, Percent	SOLID	NS	Percent	77.5	76.9	74.6	76.4	92.9	94.9	96	97.5	89.9	84.1	97.3	93.8	83.6	91	84.6	95	94.5	94.5	94.4

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EPSW26	EPSW27	EPSW28	EPSW29	EPSW31	UST2_B1	UST2_B2	UST2_E1	UST2_E2	UST2_N	UST2_S	UST2_W1	UST2_W2
			Sample Name	EPSW26_EL3	EPSW27_EL1	EPSW28_EL1	EPSW29_EL1	EPSW31_EL2	UST2_B1_EL1	UST2_B2_EL1	UST2_E1_EL1	UST2_E2_EL1	UST2_N_EL1	UST2_S_EL1	UST2_W1_EL1	UST2_W2_EL1
			Sample Date	04/22/2025	09/11/2025	09/11/2025	09/11/2025	05/01/2025	05/07/2025	05/07/2025	05/07/2025	05/07/2025	05/07/2025	05/07/2025	05/07/2025	05/07/2025
			Sample Elevation	3	1	1	1	2	1	1	1	1	1	1	1	1
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds																
1,1,1,2-Tetrachloroethane	630-20-6	NS	mg/kg	<0.00054 U	NA	NA	NA	<0.00056 U	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	71-55-6	0.68	mg/kg	<0.00054 U	<0.0052 U	<0.0054 U	<0.005 U	<0.00056 U	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	79-34-5	NS	mg/kg	<0.00054 U	<0.0052 U	<0.0054 U	<0.005 U	<0.00056 U	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	NS	mg/kg	NA	<0.0052 U	<0.0054 U	<0.005 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	79-00-5	NS	mg/kg	<0.0011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0011 U	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	75-34-3	0.27	mg/kg	<0.0011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0011 U	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	75-35-4	0.33	mg/kg	<0.0011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0011 U	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropene	563-58-6	NS	mg/kg	<0.00054 U	NA	NA	NA	<0.00056 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	87-61-6	NS	mg/kg	<0.0022 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	96-18-4	NS	mg/kg	<0.0022 U	NA	NA	NA	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetramethylbenzene	95-93-2	NS	mg/kg	<0.0022 U	NA	NA	NA	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	120-82-1	NS	mg/kg	<0.0022 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	95-63-6	3.6	mg/kg	<0.0022 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0022 U	<0.0022 U	<0.0023 U	<0.0039 U	<0.0024 U	<0.0024 U	<0.0024 U	<0.0048 U	<0.0022 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	mg/kg	<0.0032 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0034 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	mg/kg	<0.0011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0011 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	95-50-1	1.1	mg/kg	<0.0022 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	107-06-2	0.02	mg/kg	<0.0011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0011 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	78-87-5	NS	mg/kg	<0.0011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0011 U	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	mg/kg	<0.0022 UJ	<0.0052 U	<0.0054 U	<0.005 U	<0.0022 U	<0.0022 U	<0.0023 U	<0.0039 U	<0.0024 U	<0.0024 U	<0.0024 U	<0.0048 U	<0.0022 U
1,3-Dichlorobenzene	541-73-1	2.4	mg/kg	<0.0022 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichloropropane	142-28-9	NS	mg/kg	<0.0022 U	NA	NA	NA	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	106-46-7	1.8	mg/kg	<0.0022 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Diethyl Benzene	105-05-5	NS	mg/kg	<0.0022 U	NA	NA	NA	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	mg/kg	<0.087 U	<0.077 U	<0.08 U	<0.075 U	<0.09 U	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	594-20-7	NS	mg/kg	<0.0022 U	NA	NA	NA	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	95-49-8	NS	mg/kg	<0.0022 U	NA	NA	NA	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone (MBK)	591-78-6	NS	mg/kg	<0.011 U	<0.026 U	<0.027 U	<0.025 U	<0.011 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorotoluene	106-43-4	NS	mg/kg	<0.0022 U	NA	NA	NA	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Ethyltoluene	622-96-8	NS	mg/kg	<0.0022 U	NA	NA	NA	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	67-64-1	**0.05**	mg/kg	<0.011 U	<0.026 U	<0.027 U	<0.025 U	0.0064 J	NA	NA	NA	NA	NA	NA	NA	NA
Acrolein	107-02-8	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acrylonitrile	107-13-1	NS	mg/kg	<0.0043 U	NA	NA	NA	<0.0045 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	71-43-2	0.06	mg/kg	<0.00054 U	<0.0052 U	<0.0054 U	<0.005 U	<0.00056 U	<0.00054 U	<0.00058 U	<0.00098 U	<0.0006 U	<0.00059 U	<0.0006 U	<0.0012 U	<0.00056 U
Bromobenzene	108-86-1	NS	mg/kg	<0.0022 U	NA	NA	NA	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	74-97-5	NS	mg/kg	<0.0022 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	75-27-4	NS	mg/kg	<0.00054 U	<0.0052 U	<0.0054 U	<0.005 U	<0.00056 U	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	75-25-2	NS	mg/kg	<0.0043 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0045 U	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	74-83-9	NS	mg/kg	<0.0022 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Disulfide	75-15-0	NS	mg/kg	<0.011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.011 U	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Tetrachloride	56-23-5	0.76	mg/kg	<0.0011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0011 U	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	108-90-7	1.1	mg/kg	<0.00054 U	<0.0052 U	<0.0054 U	<0.005 U	<0.00056 U	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	75-00-3	NS	mg/kg	<0.0022 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	67-66-3	0.37	mg/kg	<0.0016 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0017 U	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	74-87-3	NS	mg/kg	<0.0043 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0045 U	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,2-Dichloroethene	156-59-2	0.25	mg/kg	<0.0011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0011 U	NA	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	10061-01-5	NS	mg/kg	<0.00054 U	<0.0052 U	<0.0054 U	<0.005 U	<0.00056 U	NA	NA	NA	NA	NA	NA	NA	NA
Cyclohexane	110-82-7	NS	mg/kg	NA	<0.0052 U	<0.0054 U	<0.005 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cymene	99-87-6	NS	mg/kg	<0.0011 U	NA	NA	NA	<0.0011 U	<0.0011 U	<0.0012 U	<0.002 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.0024 U	<0.0011 U
Dibromochloromethane	124-48-1	NS	mg/kg	<0.0011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0011 U	NA	NA	NA	NA	NA	NA	NA	NA
Dibromomethane	74-95-3	NS	mg/kg	<0.0022 U	NA	NA	NA	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane	75-71-8	NS	mg/kg	<0.011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.011 U	NA	NA	NA	NA	NA	NA	NA	NA
Diethyl Ether (Ethyl Ether)	60-29-7	NS	mg/kg	<0.0022 U	NA	NA	NA	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	100-41-4	1	mg/kg	<0.0011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.002 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.0024 U	<0.0011 U
Hexachlorobutadiene	87-68-3	NS	mg/kg	<0.0043 U	NA	NA	NA	<0.0045 U	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene (Cumene)	98-82-8	NS	mg/kg	<0.0011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.002 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.0024 U	<0.0011 U
M,P-Xylene	179601-23-1	NS	mg/kg	<0.0022 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0022 U	<0.0022 U	<0.0023 U	<0.0039 U	<0.0024 U	<0.0024 U	<0.0024 U	<0.0048 U	<0.0022 U
Methyl Acetate	79-20-9	NS	mg/kg	NA	<0.0052 U	<0.0054 U	<0.005 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	mg/kg	<0.011 U	<0.031 U	<0.032 U	<0.03 U	<0.011 U	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	mg/kg	<0.011 U	<0.026 U	<0.027 U	<0.025 U	<0.011 U	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	108-87-2	NS	mg/kg	NA	<0.0052 U	<0.0054 U	<0.005 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	75-09-2	0.05	mg/kg	<0.0054 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0056 U	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	91-20-3	12	mg/kg	<0.0043 U	NA	NA	NA	<0.0045 U	<0.0043 U	<0.0046 U	<0.0078 U	<0.0048 U	<0.0047 U	<0.0048 U	<0.0096 U	<0.0044 U
n-Butylbenzene	104-51-8	12	mg/kg	<0.0011 U	NA	NA	NA	<0.0011 U	<0.0011 U	<0.0012 U	<0.002 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.0024 U	<0.0011 U
n-Propylbenzene	103-65-1	3.9	mg/kg	<0.0011 U	NA	NA	NA	<0.0011 U	<0.0011 U	<0.0012 U	<0.002 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.0024 U	<0.0011 U
o-Cymene (O-Isopropyltoluene)	527-84-4	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	mg/kg	<0.0011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.002 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.0024 U	<0.0011 U
Sec-Butylbenzene	135-98-8	11	mg/kg	<0.0011 U	NA	NA	NA	<0.0011 U	<0.0011 U	<0.0012 U	<0.002 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.0024 U	<0.0011 U
Styrene	100-42-5	NS	mg/kg	<0.0011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0011 U	NA	NA	NA	NA	NA	NA	NA	NA
T-Butylbenzene	98-06-6	5.9	mg/kg	<0.0022 U	NA	NA	NA	<0.0022 U	<0.0022 U	<0.0023 U	<0.0039 U	<0.0024 U	<0.0024 U	<0.0024 U	<0.0048 U	<0.0022 U
Tert-Butyl Alcohol	75-65-0	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tert-Butyl Methyl Ether (MTBE)	1634-04-4	0.93	mg/kg	<0.0022 U	<0.01 U	<0.011 U	<0.01 U	<0.0022 U	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene (PCE)	127-18-4	1.3	mg/kg	<0.00054 U	<0.0052 U	<0.0054 U	<0.005 U	<0.00056 U	NA	NA	NA	NA	NA	NA	NA	NA
Tetrahydrofuran	109-99-9	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	108-88-3	0.7	mg/kg	<0.0011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0011 U	<0.0011 U	<0.0012 U	<0.002 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.0024 U	<0.0011 U
Total 1,2-Dichloroethene (Cis and Trans)	540-59-0	NS	mg/kg	<0.0011 U	NA	NA	NA	<0.0011 U	NA	NA	NA	NA	NA	NA	NA	NA
Total Xylenes	1330-20-7	0.26	mg/kg	<0.0011 U	NA	NA	NA	<0.0011 U	<0.0011 U	<0.0012 U	<0.002 U	<0.0012 U	<0.0012 U	<0.0012 U	<0.0024 U	<0.0011 U
Total, 1,3-Dichloropropene (Cis And Trans)	542-75-6	NS	mg/kg	<0.00054 U	NA	NA	NA	<0.00056 U	NA	NA	NA	NA	NA	NA	NA	NA
Trans-1,2-Dichloroethene	156-60-5	0.19	mg/kg	<0.0016 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0017 U	NA	NA	NA	NA	NA	NA	NA	NA
Trans-1,3-Dichloropropene	10061-02-6	NS	mg/kg	<0.0011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0011 U	NA	NA	NA	NA	NA	NA	NA	NA
Trans-1,4-Dichloro-2-Butene	110-57-6	NS	mg/kg	<0.0054 U	NA	NA	NA	<0.0056 U	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene (TCE)	79-01-6	0.47	mg/kg	<0.00054 U	<0.0052 U	<0.0054 U	<0.005 U	<0.00056 U	NA	NA	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane	75-69-4	NS	mg/kg	<0.0043 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0045 U	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Acetate	108-05-4	NS	mg/kg	<0.011 U	NA	NA	NA	<0.011 U	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Chloride	75-01-4	0.02	mg/kg	<0.0011 U	<0.0052 U	<0.0054 U	<0.005 U	<0.0011 U	NA	NA	NA	NA	NA	NA	NA	NA

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EPSW26	EPSW27	EPSW28	EPSW29	EPSW31	UST2_B1	UST2_B2	UST2_E1	UST2_E2	UST2_N	UST2_S	UST2_W1	UST2_W2
			Sample Name	EPSW26_EL3	EPSW27_EL1	EPSW28_EL1	EPSW29_EL1	EPSW31_EL2	UST2_B1_EL1	UST2_B2_EL1	UST2_E1_EL1	UST2_E2_EL1	UST2_N_EL1	UST2_S_EL1	UST2_W1_EL1	UST2_W2_EL1
			Sample Date	04/22/2025	09/11/2025	09/11/2025	09/11/2025	05/01/2025	05/07/2025	05/07/2025	05/07/2025	05/07/2025	05/07/2025	05/07/2025	05/07/2025	05/07/2025
			Sample Elevation	3	1	1	1	2	1	1	1	1	1	1	1	1
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds																
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	mg/kg	<0.17 U	<0.179 U	<0.217 U	<0.184 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	120-82-1	NS	mg/kg	<0.17 U	NA	NA	NA	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	95-50-1	1.1	mg/kg	<0.17 U	NA	NA	NA	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Diphenylhydrazine	122-66-7	NS	mg/kg	NA	<0.0895 U	<0.109 U	<0.0922 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	541-73-1	2.4	mg/kg	<0.17 U	NA	NA	NA	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	106-46-7	1.8	mg/kg	<0.17 U	NA	NA	NA	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	mg/kg	<0.025 U	<0.0198 U	<0.019 U	<0.0198 U	<0.026 U	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	58-90-2	NS	mg/kg	NA	<0.179 U	<0.217 U	<0.184 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	95-95-4	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	88-06-2	NS	mg/kg	<0.1 U	<0.0895 U	<0.109 U	<0.0922 U	<0.1 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	120-83-2	NS	mg/kg	<0.15 U	<0.0895 U	<0.109 U	<0.0922 U	<0.16 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	105-67-9	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	51-28-5	NS	mg/kg	<0.81 U	<0.179 U	<0.217 U	<0.184 U	<0.83 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	121-14-2	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	606-20-2	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	91-58-7	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	95-57-8	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	91-57-6	NS	mg/kg	<0.2 U	<0.0895 U	<0.109 U	<0.0922 U	<0.21 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol (o-Cresol)	95-48-7	0.33	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	88-74-4	NS	mg/kg	<0.17 U	<0.179 U	<0.217 U	<0.184 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	88-75-5	NS	mg/kg	<0.37 U	<0.0895 U	<0.109 U	<0.0922 U	<0.38 U	NA	NA	NA	NA	NA	NA	NA	NA
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	mg/kg	<0.24 U	<0.0895 U	<0.109 U	<0.0922 U	<0.25 U	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	91-94-1	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	99-09-2	NS	mg/kg	<0.17 U	<0.179 U	<0.217 U	<0.184 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-Methylphenol	534-52-1	NS	mg/kg	<0.44 U	<0.179 U	<0.217 U	<0.184 U	<0.45 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl Phenyl Ether	101-55-3	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-Methylphenol	59-50-7	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	106-47-8	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	100-01-6	NS	mg/kg	<0.17 U	<0.179 U	<0.217 U	<0.184 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	100-02-7	NS	mg/kg	<0.24 U	<0.179 U	<0.217 U	<0.184 U	<0.24 U	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	83-32-9	20	mg/kg	<0.14 U	<0.0895 U	<0.109 U	<0.0922 U	<0.14 U	<0.16 U	<0.17 U	<0.16 U	<0.16 U	<0.17 U	<0.17 U	<0.18 U	<0.17 U
Acenaphthylene	208-96-8	100	mg/kg	<0.14 U	<0.0895 U	<0.109 U	<0.0922 U	<0.14 U	<0.16 U	<0.17 U	<0.16 U	<0.16 U	<0.17 U	<0.17 U	<0.18 U	<0.17 U
Acetophenone	98-86-2	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Aniline (Phenylamine, Aminobenzene)	62-53-3	NS	mg/kg	NA	<0.358 U	<0.436 U	<0.369 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	120-12-7	100	mg/kg	<0.1 U	<0.0895 U	<0.109 U	<0.0922 U	<0.1 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U
Atrazine	1912-24-9	NS	mg/kg	NA	<0.0895 U	<0.109 U	<0.0922 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	100-52-7	NS	mg/kg	NA	<0.0895 U	<0.109 U	<0.0922 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzidine	92-87-5	NS	mg/kg	NA	<0.358 U	<0.436 U	<0.369 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	56-55-3	**1**	mg/kg	<0.1 U	<0.0895 U	<0.109 U	<0.0922 U	<0.1 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U
Benzo(a)pyrene	50-32-8	**1**	mg/kg	<0.14 U	<0.0895 U	<0.109 U	<0.0922 U	<0.14 U	<0.16 U	<0.17 U	<0.16 U	<0.16 U	<0.17 U	<0.17 U	<0.18 U	<0.17 U
Benzo(b)fluoranthene	205-99-2	**1**	mg/kg	<0.1 U	<0.0895 U	<0.109 U	<0.0922 U	<0.1 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U
Benzo(g,h,i)Perylene	191-24-2	100	mg/kg	<0.14 U	<0.0895 U	<0.109 U	<0.0922 U	0.084 J	<0.16 U	<0.17 U	<0.16 U	<0.16 U	<0.17 U	<0.17 U	<0.18 U	<0.17 U
Benzo(k)fluoranthene	207-08-9	**0.8**	mg/kg	<0.1 U	<0.0895 U	<0.109 U	<0.0922 U	<0.1 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U
Benzoic Acid	65-85-0	NS	mg/kg	<0.55 U	<0.0895 U	<0.109 U	<0.0922 U	<0.56 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzyl Alcohol	100-51-6	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzyl Butyl Phthalate	85-68-7	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Biphenyl (Diphenyl)	92-52-4	NS	mg/kg	<0.39 U	<0.0895 U	<0.109 U	<0.0922 U	<0.4 U	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-chloroethoxy) methane	111-91-1	NS	mg/kg	<0.18 U	<0.0895 U	<0.109 U	<0.0922 U	<0.19 U	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	mg/kg	<0.15 U	<0.0895 U	<0.109 U	<0.0922 U	<0.16 U	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-chloroisopropyl) ether	108-60-1	NS	mg/kg	<0.2 U	<0.0895 U	<0.109 U	<0.0922 U	<0.21 U	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl) phthalate	117-81-7	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Caprolactam	105-60-2	NS	mg/kg	NA	<0.179 U	<0.217 U	<0.184 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	86-74-8	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	218-01-9	**1**	mg/kg	<0.1 U	<0.0895 U	<0.109 U	<0.0922 U	<0.1 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U
Dibenz(a,h)anthracene	53-70-3	**0.33**	mg/kg	<0.1 U	<0.0895 U	<0.109 U	<0.0922 U	<0.1 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U
Dibenzofuran	132-64-9	7	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Dibutyl phthalate	84-74-2	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Diethyl phthalate	84-66-2	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	131-11-3	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Dioctyl phthalate	117-84-0	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Diphenylamine	122-39-4	NS	mg/kg	NA	<0.179 U	<0.217 U	<0.184 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	206-44-0	100	mg/kg	<0.1 U	<0.0895 U	0.0548 JD	<0.0922 U	0.03 J	0.023 J	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U
Fluorene	86-73-7	30	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	<0.2 U	<0.21 U	<0.2 U	<0.2 U	<0.21 U	<0.21 U	<0.22 U	<0.21 U
Hexachlorobenzene	118-74-1	0.33	mg/kg	<0.1 U	<0.0895 U	<0.109 U	<0.0922 U	<0.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	87-68-3	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	77-47-4	NS	mg/kg	<0.48 U	<0.0895 U	<0.109 U	<0.0922 U	<0.5 U	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	67-72-1	NS	mg/kg	<0.14 U	<0.0895 U	<0.109 U	<0.0922 U	<0.14 U	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	mg/kg	<0.14 U	<0.0895 U	<0.109 U	<0.0922 U	<0.14 U	<0.16 U	<0.17 U	<0.16 U	<0.16 U	<0.17 U	<0.17 U	<0.18 U	<0.17 U
Isophorone	78-59-1	NS	mg/kg	<0.15 U	<0.0895 U	<0.109 U	<0.0922 U	<0.16 U	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	91-20-3	12	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	98-95-3	NS	mg/kg	<0.15 U	<0.0895 U	<0.109 U	<0.0922 U	<0.16 U	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodimethylamine	62-75-9	NS	mg/kg	NA	<0.0895 U	<0.109 U	<0.0922 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodi-N-Propylamine	621-64-7	NS	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	86-30-6	NS	mg/kg	<0.14 U	<0.0895 U	<0.109 U	<0.0922 U	<0.14 U	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	87-86-5	0.8	mg/kg	<0.14 U	<0.0895 U	<0.109 U	<0.0922 U	<0.14 U	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	85-01-8	100	mg/kg	<0.1 U	<0.0895 U	<0.109 U	<0.0922 U	<0.1 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U
Phenol	108-95-2	0.33	mg/kg	<0.17 U	<0.0895 U	<0.109 U	<0.0922 U	<0.17 U	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	129-00-0	100	mg/kg	<0.1 U	<0.0895 U	0.0557 JD	<0.0922 U	0.03 J	0.025 J	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U
Pyridine	110-86-1	NS	mg/kg	NA	<0.358 U	<0.436 U	<0.369 U	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EPSW26	EPSW27	EPSW28	EPSW29	EPSW31	UST2_B1	UST2_B2	UST2_E1	UST2_E2	UST2_N	UST2_S	UST2_W1	UST2_W2
			Sample Name	EPSW26_EL3	EPSW27_EL1	EPSW28_EL1	EPSW29_EL1	EPSW31_EL2	UST2_B1_EL1	UST2_B2_EL1	UST2_E1_EL1	UST2_E2_EL1	UST2_N_EL1	UST2_S_EL1	UST2_W1_EL1	UST2_W2_EL1
			Sample Date	04/22/2025	09/11/2025	09/11/2025	09/11/2025	05/01/2025	05/07/2025	05/07/2025	05/07/2025	05/07/2025	05/07/2025	05/07/2025	05/07/2025	05/07/2025
			Sample Elevation	3	1	1	1	2	1	1	1	1	1	1	1	1
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																
4,4'-DDD	72-54-8	**0.0033**	mg/kg	<0.00162 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.00165 U	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	72-55-9	**0.0033**	mg/kg	<0.00162 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.00165 U	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	50-29-3	**0.0033**	mg/kg	<0.00162 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.00165 U	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	309-00-2	0.005	mg/kg	<0.00162 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.00165 U	NA	NA	NA	NA	NA	NA	NA	NA
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	mg/kg	<0.000677 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.000689 U	NA	NA	NA	NA	NA	NA	NA	NA
Alpha Chlordane	5103-71-9	0.094	mg/kg	<0.00203 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.00207 U	NA	NA	NA	NA	NA	NA	NA	NA
Alpha Endosulfan	959-98-8	2.4	mg/kg	<0.00162 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.00165 U	NA	NA	NA	NA	NA	NA	NA	NA
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	mg/kg	<0.00162 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.00165 U	NA	NA	NA	NA	NA	NA	NA	NA
Beta Endosulfan	33213-65-9	2.4	mg/kg	<0.00162 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.00165 U	NA	NA	NA	NA	NA	NA	NA	NA
Chlordane (alpha and gamma)	57-74-9	NS	mg/kg	<0.0135 U	<0.0356 U	<0.0432 U	<0.0367 U	<0.0138 U	NA	NA	NA	NA	NA	NA	NA	NA
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	mg/kg	<0.00162 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.00165 U	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	60-57-1	**0.005**	mg/kg	<0.00102 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.00103 U	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan Sulfate	1031-07-8	2.4	mg/kg	<0.000677 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.000689 U	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	72-20-8	0.014	mg/kg	<0.000677 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.000689 U	NA	NA	NA	NA	NA	NA	NA	NA
Endrin Aldehyde	7421-93-4	NS	mg/kg	<0.00203 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.00207 U	NA	NA	NA	NA	NA	NA	NA	NA
Endrin Ketone	53494-70-5	NS	mg/kg	<0.00162 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.00165 U	NA	NA	NA	NA	NA	NA	NA	NA
Gamma Bhc (Lindane)	58-89-9	0.1	mg/kg	<0.000677 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.000689 U	NA	NA	NA	NA	NA	NA	NA	NA
Gamma Chlordane (Trans)	5103-74-2	NS	mg/kg	<0.00203 U	NA	NA	NA	<0.00207 U	NA	NA	NA	NA	NA	NA	NA	NA
Gamma-Chlordane	5566-34-7	NS	mg/kg	NA	<0.00178 U	<0.00216 U	<0.00184 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	76-44-8	0.042	mg/kg	<0.000812 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.000827 U	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor Epoxide	1024-57-3	NS	mg/kg	<0.00305 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.0031 U	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	72-43-5	NS	mg/kg	<0.00305 U	<0.00178 U	<0.00216 U	<0.00184 U	<0.0031 U	NA	NA	NA	NA	NA	NA	NA	NA
Toxaphene	8001-35-2	NS	mg/kg	<0.0305 U	<0.178 U	<0.216 U	<0.184 U	<0.031 U	NA	NA	NA	NA	NA	NA	NA	NA
Herbicides																
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	mg/kg	<0.168 U	<0.0215 U	<0.0262 U	<0.0221 U	<0.175 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	mg/kg	<0.168 U	<0.0215 U	<0.0262 U	<0.0221 U	<0.175 U	NA	NA	NA	NA	NA	NA	NA	NA
Silvex (2,4,5-Tp)	93-72-1	3.8	mg/kg	<0.168 U	<0.0215 U	<0.0262 U	<0.0221 U	<0.175 U	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyl																
PCB-1016 (Aroclor 1016)	12674-11-2	NS	mg/kg	<0.0502 U	<0.018 U	<0.0218 U	<0.0185 U	<0.0502 U	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1221 (Aroclor 1221)	11104-28-2	NS	mg/kg	<0.0502 U	<0.018 U	<0.0218 U	<0.0185 U	<0.0502 U	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1232 (Aroclor 1232)	11141-16-5	NS	mg/kg	<0.0502 U	<0.018 U	<0.0218 U	<0.0185 U	<0.0502 U	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1242 (Aroclor 1242)	53469-21-9	NS	mg/kg	<0.0502 U	<0.018 U	<0.0218 U	<0.0185 U	<0.0502 U	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1248 (Aroclor 1248)	12672-29-6	NS	mg/kg	<0.0502 U	<0.018 U	<0.0218 U	<0.0185 U	<0.0502 U	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1254 (Aroclor 1254)	11097-69-1	NS	mg/kg	<0.0502 U	<0.018 U	<0.0218 U	<0.0185 U	<0.0502 U	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1260 (Aroclor 1260)	11096-82-5	NS	mg/kg	<0.0502 U	<0.018 U	<0.0218 U	<0.0185 U	<0.0502 U	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1262 (Aroclor 1262)	37324-23-5	NS	mg/kg	<0.0502 U	NA	NA	NA	<0.0502 U	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1268 (Aroclor 1268)	11100-14-4	NS	mg/kg	<0.0502 U	NA	NA	NA	<0.0502 U	NA	NA	NA	NA	NA	NA	NA	NA
Total PCBs	1336-36-3	0.1	mg/kg	<0.0502 U	<0.018 U	<0.0218 U	<0.0185 U	<0.0502 U	NA	NA	NA	NA	NA	NA	NA	NA
Metals																
Aluminum	7429-90-5	NS	mg/kg	210	630	982	989	352	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	7440-36-0	NS	mg/kg	<4.03 U	<2.26 U	<2.74 U	<2.33 U	<4.01 U	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	7440-38-2	13	mg/kg	0.392 J	<1.36 U	<1.64 U	2.94	0.566 J	NA	NA	NA	NA	NA	NA	NA	NA
Barium	7440-39-3	**350**	mg/kg	2.72	5.66	17.4	5.52	5.66	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	7440-41-7	7.2	mg/kg	<0.403 U	<0.046 U	<0.055 U	<0.047 U	<0.401 U	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	7440-43-9	2.5	mg/kg	<0.806 U	<0.272 U	<0.329 U	<0.279 U	<0.802 U	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	7440-70-2	NS	mg/kg	186	541	1,570	1,480	464	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Hexavalent	18540-29-9	**1**	mg/kg	<0.83 U	<0.543 U	0.659	<0.558 U	0.352 J	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Total	7440-47-3	NS	mg/kg	1.76	3.94	4.6	8.41	3.36	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Trivalent	16065-83-1	30	mg/kg	1.76	3.94	3.94	8.41	3.01 J	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	7440-48-4	NS	mg/kg	<1.61 U	0.707	0.953	1.27	0.31 J	NA	NA	NA	NA	NA	NA	NA	NA
Copper	7440-50-8	50	mg/kg	0.462 J	<1.81 U	2.63	<1.86 U	0.712 J	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	57-12-5	27	mg/kg	<0.98 UJ	<0.543 U	<0.657 U	<0.558 U	<1 U	NA	NA	NA	NA	NA	NA	NA	NA
Iron	7439-89-6	NS	mg/kg	554	1,280	2,000	2,670	917	NA	NA	NA	NA	NA	NA	NA	NA
Lead	7439-92-1	**63**	mg/kg	1.89 J	2.24	18.7	5.66	6.78	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	7439-95-4	NS	mg/kg	78.3	241	541	452	150	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	7439-96-5	1600	mg/kg	9.41	30.2	33.2	85	16.8	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	7439-97-6	**0.18**	mg/kg	<0.072 U	<0.0326 U	<0.0394 U	<0.0335 U	<0.08 U	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	7440-02-0	30	mg/kg	<2.02 U	1.09	2.03	1.64	0.848 J	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	7440-09-7	NS	mg/kg	45 J	138 B	233 B	187 B	70.5 J	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	7782-49-2	3.9	mg/kg	<1.61 U	<2.26 U	<2.74 U	<2.33 U	<1.6 U	NA	NA	NA	NA	NA	NA	NA	NA
Silver	7440-22-4	2	mg/kg	<0.403 U	<0.457 U	<0.552 U	<0.469 U	<0.401 U	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	7440-23-5	NS	mg/kg	<161 U	<45.3 U	142	48.5	<160 U	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	7440-28-0	NS	mg/kg	<1.61 U	<1.82 U	<2.19 U	<1.86 U	<1.6 U	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	7440-62-2	NS	mg/kg	1.71	3.8	4.64	9.54	3.62	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	7440-66-6	**109**	mg/kg	3.49 J	15.1	23.5	4.75	15.5	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry																
Solids, Percent	SOLID	NS	Percent	96.4	92	76.1	89.6	93.8	81	76.6	80	81.5	77.6	78.5	74.3	78.3

Table 3A
Confirmation Soil Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Notes:

CAS - Chemical Abstract Service
NS - No standard
mg/kg - milligram per kilogram
NA - Not analyzed
RL - Reporting limit
<RL - Not detected
Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 of the Official Compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use Soil Cleanup Objectives (SCO).
Criterion comparisons for 3- & 4-methylphenol (m&p cresol) are provided for reference. Promulgated SCOs are for 3-methylphenol (m-cresol) and 4-methylphenol (p-cresol).

Qualifiers:

D - The concentration reported is a result of a diluted sample.

J - The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.

UJ - The analyte was not detected at a level greater than or equal to the RL; however, the reported RL is approximate and may be inaccurate or imprecise.

P - The relative percent difference (RPD) between the results for the two columns exceeds the method-specified criteria.

U - The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the RL or the sample concentration for results impacted by blank contamination.

B - The analyte was found in the associated analysis batch blank.
S - Indicates that the reported values were determined by the method of standard additions.

Exceedance Summary:

10 - Result exceeds Unrestricted Use SCOs

Table 3B
Confirmation Soil Sample Analytical Results Summary - PFAS
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP01	EP02	EP03	EP04	EP05	EP06	EP07	EP08	EP09	EP10	EP11	EP12
			Sample Name	EP01_EL4.5	EP02_EL4.5	EP03_EL4.5	EP04_EL4.5	EP05_EL4.5	EP06_EL4.5	EP07_EL3	EP08_EL3	EP09_EL1.5	EP10_EL1.5	EP11_EL1.5	EP12_EL1.5
			Sample Date	09/15/2025	09/15/2025	09/15/2025	09/15/2025	09/15/2025	09/11/2025	09/05/2025	09/05/2025	09/18/2025	09/18/2025	09/22/2025	09/16/2025
			Sample Elevation	4.5	4.5	4.5	4.5	4.5	4.5	3	3	1.5	1.5	1.5	1.5
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances															
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	763051-92-9	NS	mg/kg	<0.000783 U	<0.000801 U	<0.000784 UJ	<0.000784 UJ	<0.000785 UJ	<0.000779 U	<0.000789 U	<0.000788 U	<0.000814 UJ	<0.000844 UJ	<0.000809 U	<0.000882 UJ
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2 FTS)	39108-34-4	NS	mg/kg	<0.000796 U	<0.000814 U	<0.000796 U	<0.000796 U	<0.000798 U	<0.000791 U	<0.000802 U	<0.0008 U	<0.000827 U	<0.000858 U	<0.000822 U	<0.000896 U
1H,1H,2H,2H-Perfluorohexane Sulfonic Acid (4:2 FTS)	757124-72-4	NS	mg/kg	<0.000777 UJ	<0.000795 UJ	<0.000778 UJ	<0.000777 UJ	<0.000779 UJ	<0.000773 U	<0.000783 U	<0.000781 U	<0.000808 U	<0.000838 U	<0.000803 U	<0.000875 UJ
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2 FTS)	27619-97-2	NS	mg/kg	<0.000787 U	<0.000805 U	<0.000788 U	<0.000788 U	<0.000789 U	<0.000783 U	<0.000793 U	<0.000792 U	<0.000818 U	<0.000849 U	<0.000814 U	<0.000887 U
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3 FTCA)	914637-49-3	NS	mg/kg	<0.00518 U	<0.0053 U	<0.00518 U	<0.00518 U	<0.00519 UJ	<0.00515 U	<0.00522 U	<0.00521 U	<0.00538 U	<0.00558 U	<0.00535 U	<0.00583 UJ
3-Perfluoroheptyl Propanoic Acid (7:3 FTCA)	812-70-4	NS	mg/kg	<0.00518 U	<0.0053 U	<0.00518 U	<0.00518 U	<0.00519 UJ	<0.00515 U	<0.00522 U	<0.00521 U	<0.00538 U	<0.00558 U	<0.00535 U	<0.00583 UJ
3-Perfluoropropyl Propanoic Acid (3:3 FTCA)	356-02-5	NS	mg/kg	<0.00104 U	<0.00106 U	<0.00104 U	<0.00104 U	<0.00104 UJ	<0.00103 U	<0.00104 U	<0.00104 U	<0.00108 U	<0.00112 U	<0.00107 U	<0.00117 UJ
4,8-Dioxa-3H-perfluorononanoic Acid (ADONA)	919005-14-4	NS	mg/kg	<0.000783 U	<0.000801 U	<0.000784 UJ	<0.000784 UJ	<0.000785 UJ	<0.000779 U	<0.000789 U	<0.000788 U	<0.000814 U	<0.000844 U	<0.000809 U	<0.000882 UJ
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	756426-58-1	NS	mg/kg	<0.000775 UJ	<0.000793 UJ	<0.000776 UJ	<0.000775 UJ	<0.000777 UJ	<0.0007 7 UJ	<0.000781 UJ	<0.000779 UJ	<0.000805 UJ	<0.000835 UJ	<0.000801 UJ	<0.000873 UJ
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	mg/kg	<0.000829 UJ	<0.000848 UJ	<0.000829 UJ	<0.000829 UJ	<0.000831 UJ	<0.000824 UJ	<0.000835 UJ	<0.000834 UJ	<0.000861 U	<0.000893 U	<0.000857 U	<0.000933 UJ
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	mg/kg	<0.000207 UJ	<0.000212 UJ	<0.000207 UJ	<0.000207 UJ	<0.000208 UJ	<0.000206 U	<0.000209 U	<0.000208 U	<0.000215 U	<0.000223 U	<0.000214 U	<0.000233 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	mg/kg	<0.000518 U	<0.00053 U	<0.000518 U	<0.000518 U	<0.000519 U	<0.000515 U	<0.000522 U	<0.000521 UJ	<0.000538 U	<0.000558 U	<0.000535 U	<0.000583 U
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	mg/kg	<0.00207 U	<0.00212 U	<0.00207 U	<0.00207 U	<0.00208 U	<0.00206 U	<0.00209 U	<0.00208 U	<0.00215 U	<0.00223 U	<0.00214 U	<0.00233 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	mg/kg	<0.000207 UJ	<0.000212 U	<0.000207 UJ	<0.000207 U	<0.000208 UJ	<0.000206 U	<0.000209 U	<0.000208 U	<0.000215 U	<0.000223 U	<0.000214 U	<0.000233 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	mg/kg	<0.000207 U	<0.000212 U	<0.000207 U	<0.000207 U	<0.000208 UJ	<0.000206 U	<0.000209 U	<0.000208 UJ	<0.000215 U	<0.000223 U	<0.000214 U	<0.000233 U
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	mg/kg	<0.00207 U	<0.00212 U	<0.00207 U	<0.00207 U	<0.00208 U	<0.00206 U	<0.00209 U	<0.00208 U	<0.00215 U	<0.00223 U	<0.00214 U	<0.00233 U
Nonafluoro-3,6-dioxaheptanoic Acid (NFDHA)	151772-58-6	NS	mg/kg	<0.000414 U	<0.000424 U	<0.000415 U	<0.000415 U	<0.000415 UJ	<0.000412 U	<0.000417 U	<0.000417 U	<0.000431 UJ	<0.000447 UJ	<0.000428 U	<0.000467 UJ
Perfluoro(2-ethoxyethane)sulfonic Acid (PFEESA)	113507-82-7	NS	mg/kg	<0.000369 U	<0.000377 U	<0.000369 U	<0.000369 U	<0.00037 UJ	<0.000367 U	<0.000372 U	<0.000371 U	<0.000383 U	<0.000398 U	<0.000381 U	<0.000415 UJ
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	NS	mg/kg	<0.000414 U	<0.000424 U	<0.000415 U	<0.000415 U	<0.000415 UJ	<0.000412 U	<0.000417 U	<0.000417 U	<0.000431 U	<0.000447 U	<0.000428 U	<0.000467 UJ
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	NS	mg/kg	<0.000414 U	<0.000424 U	<0.000415 U	<0.000415 U	<0.000415 UJ	<0.000412 U	<0.000417 U	<0.000417 U	<0.000431 U	<0.000447 U	<0.000428 U	<0.000467 UJ
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	mg/kg	<0.000183 U	<0.000188 U	<0.000184 U	<0.000183 U	<0.000184 UJ	<0.000182 U	<0.000185 U	<0.000184 UJ	<0.000191 U	<0.000198 U	<0.00019 U	<0.000206 U
Perfluorobutanoic acid (PFBA)	375-22-4	NS	mg/kg	<0.000829 U	<0.000848 U	<0.000829 U	<0.000829 U	<0.000831 UJ	<0.000824 U	<0.000835 U	<0.000834 U	<0.000861 U	<0.000893 U	<0.000857 U	<0.000933 UJ
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	mg/kg	<0.0002 U	<0.000205 U	<0.0002 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000201 U	0.000414 J	<0.000208 U	<0.000216 U	<0.000207 U	<0.000225 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	mg/kg	<0.000207 U	<0.000212 U	<0.000207 U	<0.000207 U	<0.000208 U	<0.000206 U	<0.000209 U	<0.000208 U	<0.000215 U	<0.000223 U	<0.000214 U	<0.000233 U
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	mg/kg	<0.000201 U	<0.000206 U	<0.000201 U	<0.000201 U	<0.000201 U	<0.0002 U	<0.000202 U	<0.000202 U	<0.000209 U	<0.000217 U	<0.000208 U	<0.000226 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	mg/kg	<0.000207 UJ	<0.000212 UJ	<0.000207 UJ	<0.000207 UJ	<0.000208 UJ	<0.000206 UJ	<0.000209 U	0.000181 J	<0.000215 U	<0.000223 U	<0.000214 U	<0.000233 UJ
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	mg/kg	<0.000207 U	<0.000212 U	<0.000207 U	<0.000207 U	<0.000208 U	<0.000206 UJ	<0.000209 U	<0.000208 U	<0.000215 U	<0.000223 U	<0.000214 U	<0.000233 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	mg/kg	<0.000207 U	<0.000212 U	<0.000207 U	<0.000207 U	<0.000208 UJ	<0.000206 U	<0.000209 U	<0.000208 U	<0.000215 U	<0.000223 U	<0.000214 U	<0.000233 UJ
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	mg/kg	<0.00019 U	<0.000194 U	<0.00019 U	<0.00019 U	<0.00019 UJ	<0.000189 U	<0.000191 U	<0.000191 U	<0.000197 U	<0.000204 U	<0.000196 U	<0.000213 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	mg/kg	<0.000207 U	<0.000212 U	<0.000207 U	<0.000207 U	<0.000208 UJ	<0.000206 U	<0.000209 U	<0.000208 U	<0.000215 U	<0.000223 U	<0.000214 U	<0.000233 UJ
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	mg/kg	<0.000199 U	<0.000203 U	<0.000199 U	<0.000199 U	<0.000199 U	<0.000198 UJ	<0.0002 U	<0.0002 U	<0.000207 U	<0.000214 U	<0.000206 U	<0.000224 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	mg/kg	<0.000207 U	<0.000212 U	<0.000207 U	<0.000207 U	<0.000208 U	<0.000206 U	<0.000209 UJ	<0.000208 UJ	<0.000215 U	<0.000223 U	<0.000214 U	<0.000233 U
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	mg/kg	<0.000207 U	<0.000212 U	<0.000207 U	<0.000207 U	<0.000208 UJ	<0.000206 U	<0.000209 U	<0.000208 U	<0.000215 U	<0.000223 U	<0.000214 U	<0.000233 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	mg/kg	<0.000193 U	<0.000197 U	<0.000193 U	<0.000193 U	<0.000193 U	<0.000192 UJ	0.000151 J	<0.000194 U	0.000847 J	<0.000208 U	0.00015 J	<0.000217 U
Perfluorooctanoic Acid (PFOA)	335-67-1	**0.00066**	mg/kg	0.0000756 J	0.0000939 J	0.0000789 J	0.000161 J	0.000113 J	0.000238	<0.000209 U	<0.000208 UJ	<0.000215 U	0.0000904 J	<0.000214 U	<0.000233 UJ
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	NS	mg/kg	<0.000195 U	<0.000199 U	<0.000195 U	<0.000195 U	<0.000195 UJ	<0.000194 U	<0.000196 U	<0.000196 U	<0.000202 U	<0.00021 U	<0.000201 U	<0.000219 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	mg/kg	<0.000414 U	<0.000424 U	<0.000415 U	<0.000415 U	<0.000415 UJ	<0.000412 U	<0.000417 U	<0.000417 U	<0.000431 U	<0.000447 U	<0.000428 U	<0.000467 UJ
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	mg/kg	<0.000207 U	<0.000212 U	<0.000207 U	<0.000207 U	<0.000208 U	<0.000206 U	<0.000209 U	<0.000208 U	<0.000215 U	<0.000223 U	<0.000214 U	<0.000233 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	mg/kg	<0.000207 U	<0.000212 U	<0.000207 U	<0.000207 U	<0.000208 U	<0.000206 UJ	<0.000209 U	<0.000208 U	<0.000215 U	<0.000223 U	<0.000214 U	<0.000233 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	mg/kg	<0.000207 U	<0.000212 U	<0.000207 U	<0.000207 U	<0.000208 U	<0.000206 U	<0.000209 U	<0.000208 U	<0.000215 U	<0.000223 U	<0.000214 U	<0.000233 U

Table 3B
Confirmation Soil Sample Analytical Results Summary - PFAS
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP13	EP14	EP15	EP16	EP17	EP18	EP19	EP20	EP21	EP22	EP22	EP23	EP24
			Sample Name	EP13_EL1.5	EP14_EL1	EP15_EL1	EP16_EL1	EP17_EL1.5	EP18_EL1.5	EP19_EL1.5	EP20_EL1.5	EP21_EL1.5	EP22_EL1	DUP04_091025	EP23_EL1	EP24_EL1
			Sample Date	09/16/2025	09/10/2025	09/05/2025	09/05/2025	09/18/2025	09/18/2025	09/22/2025	09/16/2025	09/16/2025	09/10/2025	09/10/2025	09/05/2025	09/05/2025
			Sample Elevation	1.5	1	1	1	1.5	1.5	1.5	1.5	1.5	1	1	1	1
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances																
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	763051-92-9	NS	mg/kg	<0.000845 UJ	<0.000992 U	<0.000904 UJ	<0.000973 U	<0.000852 UJ	<0.000842 UJ	<0.000792 U	<0.000819 U	<0.000836 U	<0.0009 U	<0.000814 U	<0.000947 U	<0.000969 U
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2 FTS)	39108-34-4	NS	mg/kg	<0.000858 U	<0.00101 UJ	<0.000919 U	<0.000988 U	<0.000866 U	<0.000856 U	<0.000804 U	<0.000832 U	<0.00085 U	<0.000914 U	<0.000827 UJ	<0.000962 U	<0.000985 U
1H,1H,2H,2H-Perfluorohexane Sulfonic Acid (4:2 FTS)	757124-72-4	NS	mg/kg	<0.000838 UJ	<0.000984 U	<0.000897 U	<0.000965 U	<0.000845 U	<0.000836 U	<0.000785 U	<0.000813 UJ	<0.00083 UJ	<0.000893 UJ	<0.000807 U	<0.000939 U	<0.000962 U
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2 FTS)	27619-97-2	NS	mg/kg	<0.000849 U	<0.000998 U	<0.000909 U	<0.000978 U	<0.000857 U	<0.000847 U	<0.000796 U	<0.000824 U	<0.000841 U	<0.000904 U	<0.000818 U	<0.000952 U	<0.000975 U
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3 FTCA)	914637-49-3	NS	mg/kg	<0.00559 U	<0.00656 U	<0.00598 U	<0.00643 U	<0.00564 U	<0.00557 U	<0.00523 U	<0.00542 U	<0.00553 U	<0.00595 U	<0.00538 U	<0.00626 U	<0.00641 U
3-Perfluoroheptyl Propanoic Acid (7:3 FTCA)	812-70-4	NS	mg/kg	<0.00559 U	<0.00656 U	<0.00598 U	<0.00643 U	<0.00564 U	<0.00557 U	<0.00523 U	<0.00542 U	<0.00553 U	<0.00595 U	<0.00538 U	<0.00626 U	<0.00641 U
3-Perfluoropropyl Propanoic Acid (3:3 FTCA)	356-02-5	NS	mg/kg	<0.00112 U	<0.00131 U	<0.0012 U	<0.00129 U	<0.00113 U	<0.00111 U	<0.00105 U	<0.00108 U	<0.00111 U	<0.00119 UJ	<0.00108 U	<0.00125 U	<0.00128 U
4,8-Dioxa-3H-perfluorononanoic Acid (ADONA)	919005-14-4	NS	mg/kg	<0.000845 UJ	<0.000992 U	<0.000904 UJ	<0.000973 U	<0.000852 U	<0.000842 U	<0.000792 U	<0.000819 U	<0.000836 U	<0.0009 U	<0.000814 U	<0.000947 U	<0.000969 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	756426-58-1	NS	mg/kg	<0.000836 UJ	<0.000982 UJ	<0.000895 UJ	<0.000962 UJ	<0.000843 UJ	<0.000833 UJ	<0.000783 UJ	<0.000811 UJ	<0.000828 UJ	<0.00089 U	<0.000805 UJ	<0.000937 UJ	<0.000959 UJ
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	mg/kg	<0.000894 UJ	<0.00105 UJ	<0.000957 UJ	<0.00103 UJ	<0.000902 U	<0.000891 U	<0.000838 U	<0.000867 UJ	<0.000885 UJ	<0.000952 U	<0.000861 UJ	<0.001 UJ	<0.00103 UJ
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	mg/kg	<0.000224 UJ	<0.000263 U	<0.000239 U	<0.000257 U	<0.000225 U	<0.000223 U	<0.000209 U	<0.000217 UJ	<0.000221 UJ	<0.000238 UJ	<0.000215 U	<0.00025 U	<0.000256 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	mg/kg	<0.000559 U	<0.000656 U	<0.000598 UJ	<0.000643 U	<0.000564 U	<0.000557 U	<0.000523 U	<0.000542 U	<0.000553 U	<0.000595 U	<0.000538 U	<0.000626 U	<0.000641 U
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	mg/kg	<0.00224 U	<0.00263 U	<0.00239 UJ	<0.00257 U	<0.00225 U	<0.00223 U	<0.00209 U	<0.00217 U	<0.00221 U	<0.00238 UJ	<0.00215 U	<0.0025 U	<0.00256 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	mg/kg	<0.000224 UJ	<0.000263 U	<0.000239 U	<0.000257 U	<0.000225 U	<0.000223 U	<0.000209 U	<0.000217 U	<0.000221 UJ	<0.000238 UJ	<0.000215 U	<0.00025 U	<0.000256 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	mg/kg	<0.000224 U	<0.000263 U	<0.000239 UJ	<0.000257 U	<0.000225 U	<0.000223 U	<0.000209 U	<0.000217 U	<0.000221 U	<0.000238 U	<0.000215 U	<0.00025 U	<0.000256 U
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	mg/kg	<0.00224 U	<0.00263 U	<0.00239 U	<0.00257 U	<0.00225 U	<0.00223 U	<0.00209 U	<0.00217 U	<0.00221 U	<0.00238 UJ	<0.00215 U	<0.0025 U	<0.00256 U
Nonafluoro-3,6-dioxaheptanoic Acid (NFDHA)	151772-58-6	NS	mg/kg	<0.000447 U	<0.000525 UJ	<0.000478 U	<0.000515 U	<0.000451 UJ	<0.000446 UJ	<0.000419 U	<0.000434 U	<0.000443 U	<0.000476 U	<0.000431 UJ	<0.000501 U	<0.000513 U
Perfluoro(2-ethoxyethane)sulfonic Acid (PFEESA)	113507-82-7	NS	mg/kg	<0.000398 U	<0.000467 U	<0.000426 U	<0.000458 U	<0.000401 U	<0.000397 U	<0.000373 U	<0.000386 U	<0.000394 U	<0.000424 U	<0.000383 U	<0.000446 U	<0.000456 U
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	NS	mg/kg	<0.000447 U	<0.000525 U	<0.000478 U	<0.000515 U	<0.000451 U	<0.000446 U	<0.000419 U	<0.000434 U	<0.000443 U	<0.000476 UJ	<0.000431 U	<0.000501 U	<0.000513 U
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	NS	mg/kg	<0.000447 U	<0.000525 U	<0.000478 U	<0.000515 U	<0.000451 U	<0.000446 U	<0.000419 U	<0.000434 U	<0.000443 U	<0.000476 UJ	<0.000431 U	<0.000501 U	<0.000513 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	mg/kg	<0.000198 U	<0.000232 U	<0.000212 UJ	<0.000228 U	<0.0002 U	<0.000197 U	<0.000185 U	<0.000192 U	<0.000196 U	<0.000211 U	<0.000191 U	<0.000222 U	<0.000227 UJ
Perfluorobutanoic acid (PFBA)	375-22-4	NS	mg/kg	<0.000894 U	<0.00105 U	<0.000957 UJ	<0.00103 U	<0.000902 U	<0.000891 U	<0.000838 U	<0.000867 U	<0.000885 U	<0.000952 U	<0.000861 U	<0.001 U	<0.00103 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	mg/kg	<0.000216 U	<0.000253 U	<0.000231 UJ	<0.000248 U	<0.000218 U	<0.000215 U	<0.000202 U	<0.000209 U	<0.000214 U	<0.00023 U	<0.000208 U	<0.000242 U	<0.000247 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	mg/kg	<0.000224 U	<0.000263 U	<0.000239 UJ	<0.000257 U	0.000196 J	<0.000223 U	<0.000209 U	<0.000217 U	<0.000221 U	<0.000238 U	<0.000215 U	<0.00025 U	<0.000256 U
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	mg/kg	<0.000217 U	<0.000255 U	<0.000232 UJ	<0.00025 U	<0.000219 U	<0.000216 U	<0.000203 U	<0.00021 U	<0.000215 U	<0.000231 U	<0.000209 U	<0.000243 U	<0.000249 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	mg/kg	<0.000224 UJ	<0.000263 U	<0.000239 U	<0.000257 U	<0.000225 U	<0.000223 U	<0.000209 U	<0.000217 UJ	<0.000221 UJ	<0.000238 U	<0.000215 U	<0.00025 U	<0.000256 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	mg/kg	<0.000224 U	<0.000263 U	<0.000239 UJ	<0.000257 U	<0.000225 U	<0.000223 U	<0.000209 U	<0.000217 U	<0.000221 U	<0.000238 U	<0.000215 U	<0.00025 U	<0.000256 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	mg/kg	<0.000224 U	<0.000263 UJ	<0.000239 UJ	<0.000257 U	<0.000225 U	<0.000223 U	<0.000209 U	<0.000217 U	<0.000221 U	<0.000238 UJ	<0.000215 UJ	<0.00025 U	<0.000256 U
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	mg/kg	<0.000205 U	<0.00024 U	<0.000219 UJ	<0.000235 U	<0.000206 U	<0.000204 U	<0.000192 U	<0.000198 U	<0.000202 U	<0.000218 UJ	<0.000197 U	<0.000229 U	<0.000235 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	mg/kg	<0.000224 U	<0.000263 U	<0.000239 U	<0.000257 U	<0.000225 U	<0.000223 U	0.0000564 J	<0.000217 U	<0.000221 U	<0.000238 U	<0.000215 U	<0.00025 U	<0.000256 U
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	mg/kg	<0.000215 U	<0.000252 U	<0.00023 UJ	<0.000247 U	<0.000216 U	<0.000214 U	<0.000201 U	<0.000208 U	<0.000212 U	<0.000228 U	<0.000207 U	<0.00024 U	<0.000246 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	mg/kg	<0.000224 U	<0.000263 U	<0.000239 UJ	<0.000257 U	<0.000225 U	<0.000223 U	<0.000209 U	<0.000217 U	<0.000221 U	<0.000238 U	<0.000215 U	<0.00025 U	<0.000256 UJ
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	mg/kg	<0.000224 U	<0.000263 U	<0.000239 U	<0.000257 U	<0.000225 U	<0.000223 U	<0.000209 U	<0.000217 U	<0.000221 U	<0.000238 U	<0.000215 U	<0.00025 U	<0.000256 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	mg/kg	<0.000208 U	<0.000244 U	<0.000222 UJ	<0.000239 U	0.000271	0.000827 J	0.000446	<0.000202 U	0.000341	0.000223	0.000274	0.0002 J	0.000611
Perfluorooctanoic Acid (PFOA)	335-67-1	**0.00066**	mg/kg	<0.000224 UJ	<0.000263 U	<0.000239 UJ	<0.000257 U	<0.000225 U	0.000112 J	<0.000209 U	<0.000217 UJ	<0.000221 UJ	<0.000238 UJ	<0.000215 U	<0.00025 U	<0.000256 U
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	NS	mg/kg	<0.00021 U	<0.000247 U	<0.000225 UJ	<0.000242 U	<0.000212 U	<0.000209 U	<0.000197 U	<0.000204 U	<0.000208 U	<0.000224 UJ	<0.000202 U	<0.000235 U	<0.000241 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	mg/kg	<0.000447 U	<0.000525 U	<0.000478 U	<0.000515 U	<0.000451 U	<0.000446 U	<0.000419 U	<0.000434 U	<0.000443 U	<0.000476 UJ	<0.000431 U	<0.000501 U	<0.000513 U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	mg/kg	<0.000224 U	<0.000263 UJ	<0.000239 U	<0.000257 U	<0.000225 U	<0.000223 U	<0.000209 U	<0.000217 U	<0.000221 U	<0.000238 U	<0.000215 UJ	<0.00025 U	<0.000256 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	mg/kg	<0.000224 U	<0.000263 U	<0.000239 U	<0.000257 U	<0.000225 U	<0.000223 U	<0.000209 U	<0.000217 U	<0.000221 U	<0.000238 U	<0.000215 U	<0.00025 U	<0.000256 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	mg/kg	<0.000224 U	<0.000263 U	<0.000239 U	<0.000257 U	<0.000225 U	<0.000223 U	<0.000209 U	<0.000217 U	<0.000221 U	<0.000238 U	<0.000215 U	<0.00025 U	<0.000256 U

Table 3B
Confirmation Soil Sample Analytical Results Summary - PFAS
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP25	EP26	EP27	EP28	EP29	EP30	EP31	EP32	EP33	EP33	EP34	EP35	EP36	EP37
			Sample Name	EP25_EL1.5	EP26_EL1.5	EP27_EL3	EP28_EL3	EP29_EL3	EP30_EL1	EP31_EL1	EP32_EL1	EP33_EL2	DUP05_092325	EP34_EL2	EP35_EL2	EP36_EL7	EP37_EL7
			Sample Date	09/25/2025	09/18/2025	09/22/2025	09/22/2025	09/22/2025	09/11/2025	09/10/2025	09/09/2025	09/23/2025	09/23/2025	09/23/2025	09/23/2025	08/27/2025	08/27/2025
			Sample Elevation	1.5	1.5	3	3	3	1	1	1	2	2	2	2	7	7
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances																	
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	763051-92-9	NS	mg/kg	<0.000801 U	<0.000871 UJ	<0.000815 U	<0.00079 U	<0.000789 U	<0.000875 U	<0.000912 U	<0.000998 UJ	<0.000794 U	<0.000788 U	<0.000806 UJ	<0.000785 U	<0.000806 U	<0.000808 U
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2 FTS)	39108-34-4	NS	mg/kg	<0.000814 U	<0.000885 U	<0.000828 U	<0.000803 U	<0.000801 U	<0.000888 U	<0.000926 UJ	<0.00101 UJ	<0.000807 U	<0.000801 U	<0.000819 U	<0.000798 U	<0.000819 U	<0.000821 U
1H,1H,2H,2H-Perfluorohexane Sulfonic Acid (4:2 FTS)	757124-72-4	NS	mg/kg	<0.000795 U	<0.000864 U	<0.000809 U	<0.000784 U	<0.000782 U	<0.000868 U	<0.000905 U	<0.00099 U	<0.000788 U	<0.000782 U	<0.0008 U	<0.000779 U	<0.0008 U	<0.000801 U
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2 FTS)	27619-97-2	NS	mg/kg	<0.000805 U	<0.000876 U	<0.000819 U	<0.000794 U	<0.000793 U	<0.000879 U	<0.000917 U	<0.001 U	<0.000799 U	<0.000793 U	<0.000811 U	<0.00079 U	<0.00081 U	<0.000812 U
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3 FTCA)	914637-49-3	NS	mg/kg	<0.0053 U	<0.00576 U	<0.00539 U	<0.00523 U	<0.00522 U	<0.00578 U	<0.00603 U	<0.0066 U	<0.00525 U	<0.00521 U	<0.00533 U	<0.00519 U	<0.00533 U	<0.00534 U
3-Perfluoroheptyl Propanoic Acid (7:3 FTCA)	812-70-4	NS	mg/kg	<0.0053 U	<0.00576 U	<0.00539 U	<0.00523 U	<0.00522 U	<0.00578 U	<0.00603 U	<0.0066 UJ	<0.00525 U	<0.00521 U	<0.00533 U	<0.00519 U	<0.00533 U	<0.00534 U
3-Perfluoropropyl Propanoic Acid (3:3 FTCA)	356-02-5	NS	mg/kg	<0.00106 U	<0.00115 U	<0.00108 U	<0.00105 U	<0.00104 U	<0.00116 U	<0.00121 U	<0.00132 U	<0.00105 U	<0.00104 U	<0.00107 U	<0.00104 U	<0.00107 U	<0.00107 U
4,8-Dioxa-3H-perfluorononanoic Acid (ADONA)	919005-14-4	NS	mg/kg	<0.000801 U	<0.000871 U	<0.000815 U	<0.00079 U	<0.000789 U	<0.000875 U	<0.000912 U	<0.000998 UJ	<0.000794 U	<0.000788 U	<0.000806 UJ	<0.000785 U	<0.000806 U	<0.000808 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	756426-58-1	NS	mg/kg	<0.000793 U	<0.000862 UJ	<0.000806 UJ	<0.000782 UJ	<0.00078 UJ	<0.000865 UJ	<0.000902 UJ	<0.000987 UJ	<0.000786 UJ	<0.00078 U	<0.000798 UJ	<0.000777 UJ	<0.000798 UJ	<0.000799 UJ
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	mg/kg	<0.000848 U	<0.000922 U	<0.000862 U	<0.000836 U	<0.000834 U	<0.000925 UJ	<0.000965 UJ	<0.00106 UJ	<0.000841 U	<0.000834 U	<0.000853 UJ	<0.000831 U	<0.000853 UJ	<0.000855 UJ
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	mg/kg	<0.000212 U	<0.00023 U	<0.000216 U	<0.000209 U	<0.000209 U	<0.000231 U	<0.000241 U	<0.000264 U	<0.00021 U	<0.000209 U	<0.000213 U	<0.000208 U	<0.000213 U	<0.000214 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	mg/kg	<0.00053 U	<0.000576 U	<0.000539 U	<0.000523 U	<0.000522 U	<0.000578 U	<0.000603 U	<0.00066 U	<0.000525 U	<0.000521 U	<0.000533 U	<0.000519 U	<0.000533 U	<0.000534 UJ
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	mg/kg	<0.00212 U	<0.0023 U	<0.00216 U	<0.00209 U	<0.00209 U	<0.00231 U	<0.00241 U	<0.00264 U	<0.0021 U	<0.00209 U	<0.00213 U	<0.00208 U	0.000883 J	<0.00214 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	mg/kg	<0.000212 U	<0.00023 U	<0.000216 U	<0.000209 U	<0.000209 U	<0.000231 U	<0.000241 U	<0.000264 U	<0.00021 U	<0.000209 U	<0.000213 U	<0.000208 U	<0.000213 U	<0.000214 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	mg/kg	<0.000212 U	<0.00023 U	<0.000216 U	<0.000209 U	<0.000209 U	<0.000231 U	<0.000241 U	<0.000264 U	<0.00021 U	<0.000209 U	<0.000213 U	<0.000208 U	0.000112 UJ	<0.000214 UJ
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	mg/kg	<0.00212 U	<0.0023 U	<0.00216 U	<0.00209 U	<0.00209 U	<0.00231 U	<0.00241 U	<0.00264 U	<0.0021 U	<0.00209 U	<0.00213 U	<0.00208 U	<0.00213 U	<0.00214 U
Nonafluoro-3,6-dioxaheptanoic Acid (NFDHA)	151772-58-6	NS	mg/kg	<0.000424 U	<0.000461 UJ	<0.000431 U	<0.000418 U	<0.000417 U	<0.000463 U	<0.000482 UJ	<0.000528 U	<0.00042 U	<0.000417 U	<0.000427 U	<0.000416 U	<0.000427 U	<0.000427 U
Perfluoro(2-ethoxyethane)sulfonic Acid (PFEESA)	113507-82-7	NS	mg/kg	<0.000377 U	<0.00041 U	<0.000384 U	<0.000372 U	<0.000371 U	<0.000412 U	<0.000429 U	<0.00047 U	<0.000374 U	<0.000371 U	<0.00038 U	<0.00037 U	<0.00038 U	<0.00038 U
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	NS	mg/kg	<0.000424 U	<0.000461 U	<0.000431 U	<0.000418 U	<0.000417 U	<0.000463 U	<0.000482 U	<0.000528 U	<0.00042 U	<0.000417 U	<0.000427 U	<0.000416 U	<0.000427 U	<0.000427 U
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	NS	mg/kg	<0.000424 U	<0.000461 U	<0.000431 U	<0.000418 U	<0.000417 U	<0.000463 U	<0.000482 U	<0.000528 U	<0.00042 U	<0.000417 U	<0.000427 U	<0.000416 U	<0.000427 U	<0.000427 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	mg/kg	<0.000188 U	<0.000204 U	<0.000191 U	<0.000185 U	<0.000185 U	<0.000205 U	<0.000213 U	<0.000234 U	<0.000186 U	<0.000185 U	<0.000189 U	<0.000184 U	<0.000189 UJ	<0.000189 UJ
Perfluorobutanoic acid (PFBA)	375-22-4	NS	mg/kg	<0.000848 U	<0.000922 U	<0.000862 U	<0.000836 U	<0.000834 U	<0.000925 U	<0.000965 U	<0.00106 U	<0.000841 U	<0.000834 U	<0.000853 U	<0.000831 U	<0.000853 U	<0.000855 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	mg/kg	<0.000204 U	<0.000222 U	<0.000208 U	<0.000202 U	<0.000201 U	<0.000223 U	<0.000233 U	<0.000255 U	<0.000203 U	<0.000201 U	<0.000206 U	<0.000201 U	<0.000206 U	<0.000206 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	mg/kg	<0.000212 U	<0.00023 U	<0.000216 U	<0.000209 U	0.0000865 J	<0.000231 U	<0.000241 U	<0.000264 U	<0.00021 U	<0.000209 U	0.0000884 J	<0.000208 U	0.000336	<0.000214 U
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	mg/kg	<0.000206 U	<0.000224 U	<0.000209 U	<0.000203 U	<0.000202 U	<0.000224 U	<0.000234 U	<0.000256 U	<0.000204 U	<0.000202 U	<0.000207 U	<0.000202 U	<0.000207 U	<0.000207 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	mg/kg	0.000162 J	<0.00023 U	<0.000216 U	<0.000209 U	<0.000209 U	<0.000231 UJ	<0.000241 U	<0.000264 U	<0.00021 U	<0.000209 U	<0.000213 U	<0.000208 U	0.000102 J	<0.000214 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	mg/kg	<0.000212 U	<0.00023 U	<0.000216 U	<0.000209 U	<0.000209 U	<0.000231 UJ	<0.000241 U	<0.000264 U	<0.00021 U	<0.000209 U	<0.000213 U	<0.000208 U	<0.000213 U	<0.000214 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	mg/kg	<0.000212 U	<0.00023 U	<0.000216 U	<0.000209 U	<0.000209 U	<0.000231 U	<0.000241 UJ	<0.000264 UJ	<0.00021 U	<0.000209 U	<0.000213 U	<0.000208 U	<0.000213 U	<0.000214 U
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	mg/kg	<0.000194 U	<0.000211 U	<0.000197 U	<0.000191 U	<0.000191 U	<0.000212 U	<0.000221 U	<0.000241 U	<0.000192 U	<0.000191 U	<0.000195 UJ	<0.00019 U	<0.000195 U	<0.000196 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	mg/kg	<0.000212 U	<0.00023 U	<0.000216 U	0.0000542 J	<0.000209 U	<0.000231 U	<0.000241 U	<0.000264 U	<0.00021 U	<0.000209 U	<0.000213 U	<0.000208 U	<0.000213 U	<0.000214 U
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	mg/kg	<0.000203 U	<0.000221 U	<0.000207 U	<0.000201 U	<0.0002 U	<0.000222 UJ	<0.000232 U	<0.000253 U	<0.000202 U	<0.0002 U	<0.000205 U	<0.000199 U	<0.000205 U	<0.000205 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	mg/kg	<0.000212 U	<0.00023 U	<0.000216 U	<0.000209 U	<0.000209 U	<0.000231 U	<0.000241 U	<0.000264 U	<0.00021 U	<0.000209 U	<0.000213 U	<0.000208 U	0.000185 J	<0.000214 UJ
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	mg/kg	<0.000212 U	<0.00023 U	<0.000216 U	0.000124 J	0.000065 J	<0.000231 U	<0.000241 U	<0.000264 U	<0.00021 U	<0.000209 U	<0.000213 UJ	<0.000208 U	0.000974	<0.000214 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	mg/kg	<0.000197 UJ	<0.000214 U	0.000203	**0.0023**	**0.00105**	0.000388 J	0.000637	0.000267 J	<0.000195 U	<0.000194 UJ	0.000244	**0.00139**	**0.0102**	**0.00146**
Perfluorooctanoic Acid (PFOA)	335-67-1	**0.00066**	mg/kg	<0.000212 U	<0.00023 U	<0.000216 U	0.000156 J	0.000119 J	<0.000231 U	<0.000241 U	<0.000264 U	<0.00021 U	<0.000209 U	<0.000213 U	0.000103 J	0.000211 J	0.0000835 J
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	NS	mg/kg	<0.000199 U	<0.000217 U	<0.000203 U	<0.000196 U	<0.000196 U	<0.000217 U	<0.000227 U	<0.000248 U	<0.000198 U	<0.000196 U	<0.000201 UJ	<0.000195 U	<0.0002 U	<0.000201 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	mg/kg	<0.000424 U	<0.000461 U	<0.000431 U	0.0000872 J	0.0000865 J	<0.000463 U	<0.000482 U	<0.000528 U	<0.00042 U	<0.000417 U	<0.000427 U	<0.000416 U	<0.000427 U	<0.000427 U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	mg/kg	<0.000212 U	<0.00023 U	<0.000216 U	<0.000209 U	<0.000209 U	<0.000231 U	<0.000241 UJ	<0.000264 U	<0.00021 U	<0.000209 U	<0.000213 U	<0.000208 U	<0.000213 U	<0.000214 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	mg/kg	<0.000212 U	<0.00023 U	<0.000216 U	<0.000209 U	<0.000209 U	<0.000231 UJ	<0.000241 U	<0.000264 U	<0.00021 U	<0.000209 U	<0.000213 U	<0.000208 U	<0.000213 U	<0.000214 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	mg/kg	<0.000212 U	<0.00023 U	<0.000216 U	<0.000209 U	<0.000209 U	<0.000231 U	<0.000241 U	<0.000264 U	<0.00021 U	<0.000209 U	<0.000213 U	<0.000208 U	0.000122 J	<0.000214 U

Table 3B
Confirmation Soil Sample Analytical Results Summary - PFAS
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP38	EP39	EP40	EP41	EP42	EP43	EP44	EP45	EP46	EP47	EP48	EP49	EP50	EP50
			Sample Name	EP38_EL3	EP39_EL3	EP40_EL0	EP41_EL6	EP42_EL6	EP43_EL3	EP44_EL6	EP45_EL6.5	EP46_EL4	EP47_EL4	EP48_EL4	EP49_EL3	EP50_EL-6	DUP03_061325
			Sample Date	08/27/2025	08/27/2025	09/03/2025	04/16/2025	04/16/2025	04/22/2025	05/13/2025	05/13/2025	05/06/2025	04/28/2025	04/28/2025	04/15/2025	06/13/2025	06/13/2025
			Sample Elevation	3	3	0	6	6	3	6	6.5	4	4	4	3	-6	4
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances																	
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	763051-92-9	NS	mg/kg	<0.000958 U	<0.000963 U	<0.000958 U	<0.0008 U	<0.000797 U	<0.000797 U	<0.000794 U	<0.000798 U	<0.0008 UJ	<0.00079 U	<0.000793 U	<0.000798 U	<0.000865 UJ	<0.000872 UJ
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2 FTS)	39108-34-4	NS	mg/kg	<0.000973 U	<0.000979 U	<0.000973 U	<0.0008 U	<0.000797 U	<0.000797 U	<0.000794 U	<0.000798 U	<0.0008 U	<0.00079 U	<0.000793 U	<0.000798 U	<0.000879 U	<0.000886 U
1H,1H,2H,2H-Perfluorohexane Sulfonic Acid (4:2 FTS)	757124-72-4	NS	mg/kg	<0.00095 U	<0.000956 U	<0.00095 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.000858 U	<0.000865 UJ
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	mg/kg	NA	NA	NA	<0.0008 U	<0.000797 U	<0.000797 U	<0.000794 U	<0.000798 U	<0.0008 U	<0.00079 U	<0.000793 U	<0.000798 U	NA	NA
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2 FTS)	27619-97-2	NS	mg/kg	<0.000963 U	<0.000968 U	<0.000963 U	<0.0008 U	<0.000797 U	<0.000797 U	<0.000794 U	<0.000798 U	<0.0008 U	<0.00079 U	<0.000793 U	<0.000798 U	<0.00087 U	<0.000877 U
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3 FTCA)	914637-49-3	NS	mg/kg	<0.00633 U	<0.00637 U	<0.00634 U	<0.005 U	<0.00498 U	<0.00498 U	<0.00496 U	<0.00499 U	<0.005 UJ	<0.00494 U	<0.00496 U	<0.00499 U	<0.00572 U	<0.00577 U
3-Perfluoroheptyl Propanoic Acid (7:3 FTCA)	812-70-4	NS	mg/kg	<0.00633 U	<0.00637 U	<0.00634 U	<0.005 U	<0.00498 U	<0.00498 U	<0.00496 U	<0.00499 U	<0.005 UJ	<0.00494 U	<0.00496 U	<0.00499 U	<0.00572 U	<0.00577 U
3-Perfluoropropyl Propanoic Acid (3:3 FTCA)	356-02-5	NS	mg/kg	<0.00127 U	<0.00127 U	<0.00127 U	<0.001 U	<0.000996 U	<0.000996 U	<0.000993 U	<0.000997 U	<0.001 U	<0.000988 U	<0.000991 U	<0.000997 U	<0.00114 U	<0.00115 UJ
4,8-Dioxa-3H-perfluorononanoic Acid (ADONA)	919005-14-4	NS	mg/kg	<0.000958 U	<0.000963 U	<0.000958 U	<0.0008 U	<0.000797 U	<0.000797 U	<0.000794 U	<0.000798 U	<0.0008 UJ	<0.00079 U	<0.000793 U	<0.000798 U	<0.000865 U	<0.000872 UJ
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	756426-58-1	NS	mg/kg	<0.000947 UJ	<0.000953 UJ	<0.000948 UJ	<0.0008 U	<0.000797 U	<0.000797 U	<0.000794 U	<0.000798 U	<0.0008 UJ	<0.00079 U	<0.000793 U	<0.000798 U	<0.000856 U	<0.000863 UJ
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	mg/kg	<0.00101 UJ	<0.00102 UJ	<0.00101 UJ	<0.0008 U	<0.000797 U	<0.000797 U	<0.000794 U	<0.000798 U	<0.0008 UJ	<0.00079 U	<0.000793 U	<0.000798 U	<0.000916 U	<0.000923 UJ
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	mg/kg	<0.000253 U	<0.000255 U	<0.000253 U	<0.0002 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000229 U	<0.000231 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	mg/kg	<0.000633 U	<0.000637 U	<0.000634 U	<0.0002 U	<0.000199 U	<0.000199 UJ	<0.000198 U	<0.000199 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000229 U	<0.000231 U
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	mg/kg	<0.00253 U	<0.00255 U	<0.00253 U	<0.002 U	<0.00199 U	<0.00199 U	<0.00198 U	<0.00199 U	<0.002 UJ	<0.00198 U	<0.00198 U	<0.00199 U	<0.00229 U	<0.00231 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	mg/kg	<0.000253 U	<0.000255 U	<0.000253 U	<0.0002 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000229 U	<0.000231 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	mg/kg	<0.000253 UJ	<0.000255 UJ	<0.000253 U	<0.0002 UJ	<0.000199 UJ	<0.000199 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.000199 UJ	<0.000229 U	<0.000231 U
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	mg/kg	<0.00253 U	<0.00255 U	<0.00253 U	<0.002 U	<0.00199 U	<0.00199 U	<0.00198 U	<0.00199 U	<0.002 U	<0.00198 U	<0.00198 U	<0.00199 U	<0.00229 U	<0.00231 U
Nonafluoro-3,6-dioxaheptanoic Acid (NFDHA)	151772-58-6	NS	mg/kg	<0.000507 U	<0.00051 U	<0.000507 U	<0.0004 U	<0.000398 U	<0.000398 U	<0.000397 U	<0.000399 U	<0.0004 UJ	<0.000395 U	<0.000396 U	<0.000399 U	<0.000458 UJ	<0.000462 U
Perfluoro(2-ethoxyethane)sulfonic Acid (PFEESA)	113507-82-7	NS	mg/kg	<0.000451 U	<0.000454 U	<0.000451 U	<0.0004 U	<0.000398 U	<0.000398 U	<0.000397 U	<0.000399 U	<0.0004 UJ	<0.000395 U	<0.000396 U	<0.000399 U	<0.000407 U	<0.000411 U
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	NS	mg/kg	<0.000507 U	<0.00051 U	<0.000507 U	<0.0004 U	<0.000398 U	<0.000398 U	<0.000397 U	<0.000399 U	<0.0004 U	<0.000395 U	<0.000396 U	<0.000399 U	<0.000458 U	<0.000462 UJ
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	NS	mg/kg	<0.000507 U	<0.00051 U	<0.000507 U	<0.0004 U	<0.000398 U	<0.000398 U	<0.000397 U	<0.000399 U	<0.0004 U	<0.000395 U	<0.000396 U	<0.000399 U	<0.000458 U	<0.000462 UJ
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	mg/kg	<0.000224 U	<0.000226 UJ	<0.000224 U	<0.0002 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000203 U	<0.000204 U
Perfluorobutanoic acid (PFBA)	375-22-4	NS	mg/kg	<0.00101 U	<0.00102 U	<0.00101 U	<0.0008 U	<0.000797 U	<0.000797 U	<0.000794 U	<0.000798 U	<0.0008 UJ	<0.00079 U	<0.000793 U	<0.000798 U	<0.000916 U	<0.000923 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	mg/kg	<0.000244 U	<0.000246 U	<0.000245 U	<0.0002 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000221 U	<0.000223 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	mg/kg	<0.000253 U	<0.000255 U	<0.000253 U	<0.0002 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000229 U	<0.000231 U
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	mg/kg	<0.000246 U	<0.000247 U	<0.000246 U	<0.0002 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000222 UJ	<0.000224 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	mg/kg	<0.000253 U	<0.000255 U	<0.000253 U	<0.0002 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000199 U	<0.0002 UJ	<0.000198 U	<0.000198 U	<0.000199 U	<0.000229 U	<0.000231 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	mg/kg	<0.000253 U	<0.000255 U	<0.000253 U	<0.0002 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000229 U	<0.000231 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	mg/kg	<0.000253 U	<0.000255 U	<0.000253 U	0.00003 J	0.000041 J	0.000028 J	0.000031 J	<0.000199 U	<0.0002 U	<0.000198 U	<0.000198 U	0.000018 J	<0.000229 U	<0.000231 UJ
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	mg/kg	<0.000232 U	<0.000233 U	<0.000232 U	0.000032 J	<0.000199 U	0.000038 J	0.000024 J	<0.000199 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000209 U	<0.000211 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	mg/kg	<0.000253 U	<0.000255 U	<0.000253 U	<0.0002 U	0.000061 J	<0.000199 U	<0.000198 U	<0.000199 U	<0.0002 UJ	<0.000198 U	<0.000198 U	<0.000199 U	<0.000229 U	<0.000231 U
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	mg/kg	<0.000243 U	<0.000245 U	<0.000243 UJ	<0.0002 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.00022 U	<0.000222 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	mg/kg	<0.000253 U	<0.000255 UJ	<0.000253 UJ	0.000027 J	0.000116 J	0.000039 J	0.000056 J	0.000064 J	<0.0002 U	0.000021 J	0.000036 J	0.000043 J	<0.000229 U	<0.000231 U
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	mg/kg	<0.000253 U	<0.000255 U	<0.000253 U	<0.0002 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000199 U	<0.0002 UJ	<0.000198 U	<0.000198 U	<0.000199 U	<0.000229 U	<0.000231 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	mg/kg	0.000739	<0.000237 U	0.000162 J	0.000505	0.000328	0.000387	0.000534	**0.00102**	0.000048 J	0.000212	0.000236	0.000364	<0.000213 U	<0.000215 U
Perfluorooctanoic Acid (PFOA)	335-67-1	**0.00066**	mg/kg	<0.000253 U	<0.000255 U	<0.000253 U	0.000226	0.00012 J	**0.00076**	0.000569	0.000042 J	<0.0002 U	0.000325	0.000084 J	0.000238	<0.000229 U	<0.000231 U
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	NS	mg/kg	<0.000238 U	<0.00024 U	<0.000238 U	<0.0002 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000215 U	<0.000217 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	mg/kg	<0.000507 U	<0.00051 U	<0.000507 U	<0.0004 U	0.000049 J	<0.000398 U	<0.000397 U	<0.000399 U	<0.0004 U	<0.000395 U	<0.000396 U	<0.000399 U	<0.000458 U	<0.000462 UJ
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	mg/kg	<0.000253 U	<0.000255 U	<0.000253 U	<0.0002 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000229 U	<0.000231 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	mg/kg	<0.000253 U	<0.000255 U	<0.000253 U	<0.0002 U	<0.000199 U	<0.000199 U	<0.000198 U	<0.000199 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.000199 U	<0.000229 U	<0.000231 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	mg/kg	<0.000253 U	<0.000255 U	<0.000253 U	0.000019 J	<0.000199 U	<0.000199 UJ	<0.000198 U	<0.000199 U	<0.0002 UJ	<0.000198 U	<0.000198 U	<0.000199 U	<0.000229 U	<0.000231 U

Table 3B
Confirmation Soil Sample Analytical Results Summary - PFAS
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP51
			Sample Name	EP51_EL-6
			Sample Date	06/13/2025
			Sample Elevation	-6
			Unit	Result
Per- and Polyfluoroalkyl Substances				
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	763051-92-9	NS	mg/kg	<0.000952 UJ
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2 FTS)	39108-34-4	NS	mg/kg	<0.000968 U
1H,1H,2H,2H-Perfluorohexane Sulfonic Acid (4:2 FTS)	757124-72-4	NS	mg/kg	<0.000945 U
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	mg/kg	NA
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2 FTS)	27619-97-2	NS	mg/kg	<0.000958 U
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3 FTCA)	914637-49-3	NS	mg/kg	<0.0063 UJ
3-Perfluoroheptyl Propanoic Acid (7:3 FTCA)	812-70-4	NS	mg/kg	<0.0063 UJ
3-Perfluoropropyl Propanoic Acid (3:3 FTCA)	356-02-5	NS	mg/kg	<0.00126 U
4,8-Dioxa-3H-perfluorononanoic Acid (ADONA)	919005-14-4	NS	mg/kg	<0.000952 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	756426-58-1	NS	mg/kg	<0.000942 U
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	mg/kg	<0.00101 U
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	mg/kg	<0.000252 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	mg/kg	<0.000252 U
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	mg/kg	<0.00252 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	mg/kg	<0.000252 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	mg/kg	<0.000252 U
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	mg/kg	<0.00252 U
Nonafluoro-3,6-dioxaheptanoic Acid (NFDHA)	151772-58-6	NS	mg/kg	<0.000504 UJ
Perfluoro(2-ethoxyethane)sulfonic Acid (PFEESA)	113507-82-7	NS	mg/kg	<0.000449 UJ
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	NS	mg/kg	<0.000504 U
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	NS	mg/kg	<0.000504 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	mg/kg	<0.000223 UJ
Perfluorobutanoic acid (PFBA)	375-22-4	NS	mg/kg	<0.00101 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	mg/kg	<0.000243 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	mg/kg	<0.000252 U
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	mg/kg	<0.000244 UJ
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	mg/kg	<0.000252 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	mg/kg	<0.000252 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	mg/kg	<0.000252 U
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	mg/kg	<0.000231 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	mg/kg	<0.000252 UJ
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	mg/kg	<0.000242 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	mg/kg	<0.000252 U
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	mg/kg	<0.000252 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	mg/kg	<0.000234 U
Perfluorooctanoic Acid (PFOA)	335-67-1	**0.00066**	mg/kg	<0.000252 U
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	NS	mg/kg	<0.000237 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	mg/kg	<0.000504 U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	mg/kg	<0.000252 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	mg/kg	<0.000252 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	mg/kg	<0.000252 U

Table 3B
Confirmation Soil Sample Analytical Results Summary - PFAS
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP52	EP53	EP54	EP55	EP56	EP57	EP58	EP59	EP60	EP61	EP62	EP63
			Sample Name	EP52_EL-6	EP53_EL-6	EP54_EL4	EP55_EL3	EP56_EL4	EP57_EL3	EP58_EL-6	EP59_EL-6	EP60_EL-6	EP61_EL-6	EP62_EL4	EP63_EL4
			Sample Date	06/16/2025	06/16/2025	05/06/2025	05/02/2025	04/28/2025	04/15/2025	06/13/2025	06/13/2025	06/16/2025	06/17/2025	06/20/2025	05/23/2025
			Sample Elevation	-6	-6	4	3	3	6	-6	-6	-6	-6	4	4
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances															
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	763051-92-9	NS	mg/kg	<0.0009 U	<0.000985 U	<0.000799 U	<0.000792 U	<0.000792 U	<0.000801 U	<0.000942 UJ	<0.000918 UJ	<0.000935 U	<0.000941 U	<0.000788 UJ	<0.000808 U
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2 FTS)	39108-34-4	NS	mg/kg	<0.000915 U	<0.001 U	<0.000799 U	<0.000792 U	<0.000792 U	<0.000801 U	<0.000957 U	<0.000932 U	<0.00095 U	<0.000956 U	<0.000801 U	<0.000821 U
1H,1H,2H,2H-Perfluorohexane Sulfonic Acid (4:2 FTS)	757124-72-4	NS	mg/kg	<0.000893 U	<0.000977 U	NA	NA	NA	NA	<0.000935 U	<0.00091 U	<0.000927 U	<0.000934 U	<0.000782 U	<0.000801 U
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	mg/kg	NA	NA	<0.000799 U	<0.000792 U	<0.000792 U	<0.000801 U	NA	NA	NA	NA	NA	NA
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2 FTS)	27619-97-2	NS	mg/kg	<0.000905 U	<0.00099 U	<0.000799 U	<0.000792 U	<0.000792 U	<0.000801 U	<0.000947 U	<0.000922 U	<0.00094 U	<0.000946 U	<0.000792 U	<0.000812 U
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3 FTCA)	914637-49-3	NS	mg/kg	<0.00595 U	<0.00651 U	<0.00499 U	<0.00495 U	<0.00495 U	<0.005 U	<0.00623 U	<0.00607 U	<0.00618 U	<0.00623 U	<0.00521 UJ	<0.00534 U
3-Perfluoroheptyl Propanoic Acid (7:3 FTCA)	812-70-4	NS	mg/kg	<0.00595 U	<0.00651 U	<0.00499 U	<0.00495 U	<0.00495 U	<0.005 U	<0.00623 U	<0.00607 U	<0.00618 U	<0.00623 U	<0.00521 UJ	<0.00534 U
3-Perfluoropropyl Propanoic Acid (3:3 FTCA)	356-02-5	NS	mg/kg	<0.00119 U	<0.0013 U	<0.000998 U	<0.00099 U	<0.00099 U	<0.001 U	<0.00125 U	<0.00121 U	<0.00124 U	<0.00125 UJ	<0.00104 U	<0.00107 U
4,8-Dioxa-3H-perfluorononanoic Acid (ADONA)	919005-14-4	NS	mg/kg	<0.0009 U	<0.000985 U	<0.000799 U	<0.000792 U	<0.000792 U	<0.000801 U	<0.000942 U	<0.000918 UJ	<0.000935 U	<0.000941 U	<0.000788 UJ	<0.000808 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	756426-58-1	NS	mg/kg	<0.000891 U	<0.000974 U	<0.000799 U	<0.000792 U	<0.000792 U	<0.000801 U	<0.000932 U	<0.000908 UJ	<0.000925 U	<0.000931 U	<0.00078 UJ	<0.000799 U
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	mg/kg	<0.000953 U	<0.00104 U	<0.000799 U	<0.000792 U	<0.000792 U	<0.000801 U	<0.000997 U	<0.000971 UJ	<0.000989 U	<0.000996 U	<0.000834 UJ	<0.000855 U
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	mg/kg	<0.000238 U	<0.00026 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 U	<0.000249 U	<0.000243 U	<0.000247 U	<0.000249 U	<0.000208 U	<0.000214 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	mg/kg	<0.000238 U	<0.00026 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 U	<0.000249 U	<0.000243 U	<0.000247 U	<0.000249 U	<0.000208 U	<0.000214 U
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	mg/kg	<0.00238 U	<0.0026 U	<0.002 U	<0.00198 U	<0.00198 U	<0.002 U	<0.00249 U	<0.00243 U	<0.00247 U	<0.00249 U	<0.00208 U	<0.00214 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	mg/kg	<0.000238 U	<0.00026 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 U	<0.000249 U	<0.000243 U	<0.000247 U	<0.000249 U	<0.000208 U	<0.000214 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	mg/kg	<0.000238 U	<0.00026 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 UJ	<0.000249 U	<0.000243 U	<0.000247 U	<0.000249 U	<0.000208 U	<0.000214 U
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	mg/kg	<0.00238 U	<0.0026 U	<0.002 U	<0.00198 U	<0.00198 U	<0.002 U	<0.00249 U	<0.00243 U	<0.00247 U	<0.00249 U	<0.00208 U	<0.00214 U
Nonafluoro-3,6-dioxaheptanoic Acid (NFDHA)	151772-58-6	NS	mg/kg	<0.000476 U	<0.000521 U	<0.000399 U	<0.000396 U	<0.000396 U	<0.0004 U	<0.000499 UJ	<0.000486 UJ	<0.000495 U	<0.000498 U	<0.000417 UJ	<0.000427 U
Perfluoro(2-ethoxyethane)sulfonic Acid (PFEESA)	113507-82-7	NS	mg/kg	<0.000424 U	<0.000464 U	<0.000399 U	<0.000396 U	<0.000396 U	<0.0004 U	<0.000444 U	<0.000432 U	<0.00044 U	<0.000443 U	<0.000371 UJ	<0.00038 U
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	NS	mg/kg	<0.000476 UJ	<0.000521 UJ	<0.000399 U	<0.000396 U	<0.000396 U	<0.0004 U	<0.000499 U	<0.000486 U	<0.000495 UJ	<0.000498 UJ	<0.000417 UJ	<0.000427 U
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	NS	mg/kg	<0.000476 U	<0.000521 U	<0.000399 U	<0.000396 U	<0.000396 U	<0.0004 U	<0.000499 U	<0.000486 U	<0.000495 U	<0.000498 U	<0.000417 U	<0.000427 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	mg/kg	<0.000211 U	<0.000231 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 U	<0.000221 U	<0.000215 U	<0.000219 U	<0.00022 U	<0.000185 U	<0.000189 U
Perfluorobutanoic acid (PFBA)	375-22-4	NS	mg/kg	<0.000953 U	<0.00104 U	<0.000799 U	<0.000792 U	<0.000792 U	<0.000801 U	<0.000997 U	<0.000971 U	<0.000989 U	<0.000996 U	<0.000834 U	<0.000855 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	mg/kg	<0.00023 U	<0.000251 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 U	<0.000241 U	<0.000234 U	<0.000239 U	<0.00024 U	<0.000201 U	<0.000206 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	mg/kg	<0.000238 U	<0.00026 U	<0.0002 U	0.000039 J	<0.000198 U	<0.0002 U	<0.000249 U	<0.000243 U	<0.000247 U	<0.000249 U	<0.000208 U	<0.000214 U
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	mg/kg	<0.000231 U	<0.000253 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 U	<0.000242 UJ	<0.000235 UJ	<0.00024 U	<0.000242 U	<0.000202 U	<0.000207 UJ
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	mg/kg	<0.000238 U	<0.00026 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 U	<0.000249 U	<0.000243 U	<0.000247 U	<0.000249 U	<0.000208 U	<0.000214 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	mg/kg	<0.000238 U	<0.00026 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 U	<0.000249 U	<0.000243 U	<0.000247 U	<0.000249 U	<0.000208 U	<0.000214 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	mg/kg	<0.000238 U	<0.00026 U	<0.0002 U	0.000017 J	<0.000198 U	<0.0002 U	<0.000249 U	<0.000243 U	<0.000247 U	<0.000249 U	<0.000208 U	<0.000214 U
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	mg/kg	<0.000218 U	<0.000238 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 U	<0.000228 U	<0.000222 U	<0.000226 U	<0.000228 U	<0.000191 U	<0.000196 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	mg/kg	<0.000238 U	<0.00026 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 U	<0.000249 U	<0.000243 U	<0.000247 U	<0.000249 U	<0.000208 UJ	<0.000214 U
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	mg/kg	<0.000229 U	<0.00025 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 U	<0.000239 U	<0.000233 U	<0.000237 U	<0.000239 U	<0.0002 U	<0.000205 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	mg/kg	<0.000238 U	<0.00026 U	<0.0002 U	0.000064 J	0.000023 J	<0.0002 U	<0.000249 U	<0.000243 U	<0.000247 U	<0.000249 U	<0.000208 U	<0.000214 U
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	mg/kg	<0.000238 U	<0.00026 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 U	<0.000249 U	<0.000243 U	<0.000247 U	<0.000249 U	<0.000208 U	<0.000214 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	mg/kg	<0.000222 U	<0.000242 U	0.000116 J	0.000575	0.000433	0.000142 J	<0.000232 U	<0.000226 U	<0.00023 U	<0.000232 U	0.00031	**0.00256**
Perfluorooctanoic Acid (PFOA)	335-67-1	**0.00066**	mg/kg	<0.000238 U	<0.00026 U	<0.0002 U	0.000107 J	0.000038 J	0.00009 J	<0.000249 U	<0.000243 U	<0.000247 U	<0.000249 U	<0.000208 U	<0.000214 U
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	NS	mg/kg	<0.000224 U	<0.000245 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 U	<0.000234 U	<0.000228 U	<0.000232 U	<0.000234 U	<0.000196 U	<0.000201 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	mg/kg	<0.000476 U	<0.000521 U	<0.000399 U	<0.000396 U	<0.000396 U	<0.0004 U	<0.000499 U	<0.000486 U	<0.000495 U	<0.000498 U	<0.000417 U	<0.000427 U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	mg/kg	<0.000238 U	<0.00026 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 U	<0.000249 U	<0.000243 U	<0.000247 U	<0.000249 U	<0.000208 U	<0.000214 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	mg/kg	<0.000238 U	<0.00026 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 U	<0.000249 U	<0.000243 U	<0.000247 U	<0.000249 U	<0.000208 U	<0.000214 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	mg/kg	<0.000238 U	<0.00026 U	<0.0002 U	<0.000198 U	<0.000198 U	<0.0002 U	<0.000249 U	<0.000243 U	<0.000247 U	<0.000249 U	<0.000208 U	<0.000214 U

Table 3B
Confirmation Soil Sample Analytical Results Summary - PFAS
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP64	EP65	EP66	EP67	EP68	EP69	EP70	EP71	EP72	EP73	EP74	EP74
			Sample Name	EP64_EL3	EP65_EL3	EP66_EL-6	EP67_EL-6	EP68_EL-6	EP69_EL-6	EP70_EL4	EP71_EL4	EP72_EL3	EP73_EL4	EP74_EL4	DUP01_042125
			Sample Date	05/02/2025	04/17/2025	06/13/2025	06/13/2025	06/16/2025	06/17/2025	06/20/2025	05/23/2025	05/02/2025	04/21/2025	04/21/2025	04/21/2025
			Sample Elevation	3	3	-6	-6	-6	-6	4	4	3	4	4	4
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances															
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	763051-92-9	NS	mg/kg	<0.000794 U	<0.000798 U	<0.00103 UJ	<0.000917 UJ	<0.000889 U	<0.000953 U	<0.000788 U	<0.000794 U	<0.000791 U	<0.000799 U	<0.000798 U	<0.000798 U
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2 FTS)	39108-34-4	NS	mg/kg	<0.000794 U	<0.000798 U	<0.00105 U	<0.000931 U	<0.000903 U	<0.000969 U	<0.000801 U	<0.000807 U	<0.000791 U	<0.000799 U	<0.000798 U	<0.000798 U
1H,1H,2H,2H-Perfluorohexane Sulfonic Acid (4:2 FTS)	757124-72-4	NS	mg/kg	NA	NA	<0.00103 U	<0.00091 UJ	<0.000882 U	<0.000946 U	<0.000782 U	<0.000788 U	NA	NA	NA	NA
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	mg/kg	<0.000794 U	<0.000798 U	NA	NA	NA	NA	NA	NA	<0.000791 U	<0.000799 U	<0.000798 U	<0.000798 U
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2 FTS)	27619-97-2	NS	mg/kg	<0.000794 U	<0.000798 U	<0.00104 U	<0.000922 U	<0.000893 U	<0.000958 U	<0.000793 U	<0.000798 U	<0.000791 U	<0.000799 U	<0.000798 U	<0.000798 U
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3 FTCA)	914637-49-3	NS	mg/kg	<0.00496 U	<0.00499 U	<0.00684 UJ	<0.00606 U	<0.00588 U	<0.00631 U	<0.00521 U	<0.00525 U	<0.00494 U	<0.00499 U	<0.00499 U	<0.00499 U
3-Perfluoroheptyl Propanoic Acid (7:3 FTCA)	812-70-4	NS	mg/kg	<0.00496 U	<0.00499 U	<0.00684 UJ	<0.00606 U	<0.00588 U	<0.00631 U	<0.00521 U	<0.00525 U	<0.00494 U	<0.00499 U	<0.00499 U	<0.00499 U
3-Perfluoropropyl Propanoic Acid (3:3 FTCA)	356-02-5	NS	mg/kg	<0.000992 U	<0.000998 U	<0.00137 U	<0.00121 U	<0.00118 U	<0.00126 UJ	<0.00104 U	<0.00105 U	<0.000989 U	<0.000999 U	<0.000998 U	<0.000998 U
4,8-Dioxa-3H-perfluorononanoic Acid (ADONA)	919005-14-4	NS	mg/kg	<0.000794 U	<0.000798 U	<0.00103 UJ	<0.000917 UJ	<0.000889 U	<0.000953 U	<0.000788 U	<0.000794 U	<0.000791 U	<0.000799 U	<0.000798 U	<0.000798 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	756426-58-1	NS	mg/kg	<0.000794 U	<0.000798 U	<0.00102 UJ	<0.000907 UJ	<0.000879 U	<0.000943 U	<0.00078 U	<0.000786 U	<0.000791 U	<0.000799 U	<0.000798 U	<0.000798 U
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	mg/kg	<0.000794 U	<0.000798 U	<0.0011 UJ	<0.00097 UJ	<0.00094 U	<0.00101 U	<0.000834 U	<0.00084 U	<0.000791 U	<0.000799 U	<0.000798 U	<0.000798 U
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000274 U	<0.000243 U	<0.000235 U	<0.000252 U	<0.000209 U	<0.00021 U	<0.000198 U	<0.0002 U	<0.0002 U	<0.0002 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000274 U	<0.000243 U	<0.000235 U	<0.000252 U	<0.000209 U	<0.00021 U	<0.000198 U	<0.0002 U	<0.0002 U	<0.0002 U
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	mg/kg	<0.00198 U	<0.002 U	<0.00274 U	<0.00243 U	<0.00235 U	<0.00252 U	<0.00209 U	<0.0021 U	<0.00198 U	<0.002 U	<0.002 U	<0.002 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000274 U	<0.000243 U	<0.000235 U	<0.000252 U	<0.000209 U	<0.00021 U	<0.000198 U	<0.0002 U	<0.0002 U	<0.0002 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000274 U	<0.000243 U	<0.000235 U	<0.000252 U	<0.000209 U	<0.00021 U	<0.000198 U	<0.0002 U	<0.0002 U	<0.0002 U
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	mg/kg	<0.00198 U	<0.002 U	<0.00274 U	<0.00243 U	<0.00235 U	<0.00252 U	<0.00209 U	<0.0021 U	<0.00198 U	<0.002 U	<0.002 U	<0.002 U
Nonafluoro-3,6-dioxaheptanoic Acid (NFDHA)	151772-58-6	NS	mg/kg	<0.000397 U	<0.000399 U	<0.000548 UJ	<0.000485 UJ	<0.00047 U	<0.000504 U	<0.000417 U	<0.00042 U	<0.000396 U	<0.000399 U	<0.000399 U	<0.000399 U
Perfluoro(2-ethoxyethane)sulfonic Acid (PFEESA)	113507-82-7	NS	mg/kg	<0.000397 U	<0.000399 U	<0.000487 U	<0.000432 U	<0.000418 U	<0.000449 U	<0.000371 U	<0.000374 U	<0.000396 U	<0.000399 U	<0.000399 U	<0.000399 U
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	NS	mg/kg	<0.000397 U	<0.000399 U	<0.000548 U	<0.000485 U	<0.00047 UJ	<0.000504 UJ	<0.000417 UJ	<0.00042 U	<0.000396 U	<0.000399 U	<0.000399 U	<0.000399 U
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	NS	mg/kg	<0.000397 U	<0.000399 U	<0.000548 U	<0.000485 U	<0.00047 U	<0.000504 U	<0.000417 U	<0.00042 U	<0.000396 U	<0.000399 U	<0.000399 U	<0.000399 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000242 UJ	<0.000215 UJ	<0.000208 U	<0.000223 U	<0.000185 U	<0.000186 U	<0.000198 U	<0.0002 U	<0.0002 U	<0.0002 U
Perfluorobutanoic acid (PFBA)	375-22-4	NS	mg/kg	<0.000794 U	<0.000798 U	<0.0011 U	<0.00097 U	<0.00094 U	<0.00101 U	<0.000834 U	<0.00084 U	<0.000791 U	<0.000799 U	<0.000798 U	<0.000798 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000264 U	<0.000234 U	<0.000227 U	<0.000243 U	<0.000201 U	<0.000203 U	<0.000198 U	<0.0002 U	0.00003 J	<0.0002 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000274 U	<0.000243 U	<0.000235 U	<0.000252 U	<0.000209 U	<0.00021 U	<0.000198 U	<0.0002 U	0.000066 J	<0.0002 U
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000266 UJ	<0.000235 UJ	<0.000228 U	<0.000245 U	<0.000202 U	<0.000204 UJ	<0.000198 U	<0.0002 U	<0.0002 U	<0.0002 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000274 U	<0.000243 U	<0.000235 U	<0.000252 U	<0.000209 U	<0.00021 U	<0.000198 U	<0.0002 U	0.000022 J	0.000023 J
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000274 U	<0.000243 U	<0.000235 U	<0.000252 U	<0.000209 U	<0.00021 U	<0.000198 U	<0.0002 U	<0.0002 U	<0.0002 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000274 U	<0.000243 UJ	<0.000235 U	<0.000252 U	<0.000209 U	<0.00021 U	<0.000198 U	0.000022 J	0.000034 J	<0.0002 U
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000251 U	<0.000222 U	<0.000215 U	<0.000231 U	<0.000191 U	<0.000192 U	<0.000198 U	<0.0002 U	<0.0002 U	<0.0002 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	mg/kg	<0.000198 U	0.000029 J	<0.000274 UJ	<0.000243 U	<0.000235 U	<0.000252 U	<0.000209 U	<0.00021 U	<0.000198 U	<0.0002 U	0.000056 J	0.000032 J
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000263 U	<0.000233 U	<0.000226 U	<0.000242 U	<0.0002 U	<0.000202 U	<0.000198 U	<0.0002 U	<0.0002 U	<0.0002 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	mg/kg	0.000024 J	0.000038 J	<0.000274 U	<0.000243 U	<0.000235 U	<0.000252 U	<0.000209 U	<0.00021 U	<0.000198 U	0.00003 J	0.000052 J	0.000032 J
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000274 U	<0.000243 U	<0.000235 U	<0.000252 U	<0.000209 U	<0.00021 U	<0.000198 U	<0.0002 U	<0.0002 U	<0.0002 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	mg/kg	0.000265	0.000618	<0.000255 U	<0.000226 U	<0.000219 U	<0.000235 U	<0.000194 U	<0.000195 U	0.000166 J	0.000268	0.000694	0.000314
Perfluorooctanoic Acid (PFOA)	335-67-1	**0.00066**	mg/kg	0.000049 J	0.00017 J	<0.000274 U	<0.000243 U	<0.000235 U	<0.000252 U	<0.000209 U	<0.00021 U	<0.000198 U	0.00014 J	0.000174 J	0.000097 J
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000257 U	<0.000228 U	<0.000221 U	<0.000237 U	<0.000196 U	<0.000197 U	<0.000198 U	<0.0002 U	<0.0002 U	<0.0002 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	mg/kg	<0.000397 U	<0.000399 U	<0.000548 U	<0.000485 U	<0.00047 U	<0.000504 U	<0.000417 U	<0.00042 U	<0.000396 U	<0.000399 U	0.000052 J	<0.000399 U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000274 U	<0.000243 U	<0.000235 U	<0.000252 U	<0.000209 U	<0.00021 U	<0.000198 U	<0.0002 U	<0.0002 U	<0.0002 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000274 U	<0.000243 U	<0.000235 U	<0.000252 U	<0.000209 U	<0.00021 U	<0.000198 U	<0.0002 U	<0.0002 U	<0.0002 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	mg/kg	<0.000198 U	<0.0002 U	<0.000274 U	<0.000243 U	<0.000235 U	<0.000252 U	<0.000209 U	<0.00021 U	<0.000198 U	<0.0002 U	0.00005 J	0.000022 J

Table 3B
Confirmation Soil Sample Analytical Results Summary - PFAS
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EP75	EP76	EPSW01	EPSW02	EPSW03	EPSW04	EPSW05	EPSW06	EPSW07	EPSW08	EPSW09	EPSW10
			Sample Name	EP75_EL4	EP76_EL4	EPSW01_EL1.5	EPSW02_EL1.5	EPSW03_EL1.5	EPSW04_EL1.5	EPSW05_EL1.5	EPSW06_EL1	EPSW07_EL1	EPSW08_EL1	EPSW09_EL1	EPSW10_EL1
			Sample Date	08/01/2025	05/06/2025	09/15/2025	09/15/2025	09/15/2025	09/15/2025	09/15/2025	09/09/2025	09/09/2025	09/09/2025	09/10/2025	09/10/2025
			Sample Elevation	4	4	1.5	1.5	1.5	1.5	1.5	1	1	1	1	1
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances															
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	763051-92-9	NS	mg/kg	<0.000793 U	<0.000796 UJ	<0.000816 U	<0.000814 U	<0.000858 UJ	<0.00084 U	<0.000832 UJ	<0.000976 UJ	<0.000983 UJ	<0.00101 UJ	<0.00099 U	<0.000814 U
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2 FTS)	39108-34-4	NS	mg/kg	<0.000806 U	<0.000796 UJ	<0.000829 U	<0.000827 U	<0.000872 U	<0.000854 U	<0.000845 U	<0.000992 UJ	<0.000998 UJ	<0.00103 UJ	<0.00101 UJ	<0.000827 UJ
1H,1H,2H,2H-Perfluorohexane Sulfonic Acid (4:2 FTS)	757124-72-4	NS	mg/kg	<0.000787 U	NA	<0.00081 U	<0.000808 UJ	<0.000851 UJ	<0.000834 UJ	<0.000826 UJ	<0.000968 U	<0.000975 U	<0.001 U	<0.000982 U	<0.000807 U
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	mg/kg	NA	<0.000796 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2 FTS)	27619-97-2	NS	mg/kg	<0.000797 U	<0.000796 UJ	<0.000821 U	<0.000819 U	<0.000863 U	<0.000845 U	<0.000837 U	<0.000981 U	<0.000988 U	<0.00102 U	<0.000995 U	<0.000818 U
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3 FTCA)	914637-49-3	NS	mg/kg	<0.00525 U	<0.00498 UJ	<0.0054 U	<0.00539 U	<0.00568 UJ	<0.00556 U	<0.0055 UJ	<0.00646 U	<0.0065 U	<0.00669 U	<0.00655 U	<0.00538 U
3-Perfluoroheptyl Propanoic Acid (7:3 FTCA)	812-70-4	NS	mg/kg	<0.00525 U	<0.00498 UJ	<0.0054 U	<0.00539 U	<0.00568 UJ	<0.00556 U	<0.0055 UJ	<0.00646 UJ	<0.0065 UJ	<0.00669 UJ	<0.00655 U	<0.00538 U
3-Perfluoropropyl Propanoic Acid (3:3 FTCA)	356-02-5	NS	mg/kg	<0.00105 U	<0.000996 UJ	<0.00108 U	<0.00108 U	<0.00114 UJ	<0.00111 U	<0.0011 UJ	<0.00129 U	<0.0013 U	<0.00134 U	<0.00131 U	<0.00108 U
4,8-Dioxa-3H-perfluorononanoic Acid (ADONA)	919005-14-4	NS	mg/kg	<0.000793 U	<0.000796 UJ	<0.000816 U	<0.000814 U	<0.000858 UJ	<0.00084 U	<0.000832 UJ	<0.000976 UJ	<0.000983 UJ	<0.00101 UJ	<0.00099 U	<0.000814 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	756426-58-1	NS	mg/kg	<0.000785 U	<0.000796 UJ	<0.000808 UJ	<0.000806 UJ	<0.000849 UJ	<0.000831 UJ	<0.000823 UJ	<0.000966 UJ	<0.000972 UJ	<0.001 UJ	<0.000979 UJ	<0.000805 UJ
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	mg/kg	<0.000839 UJ	<0.000796 UJ	<0.000864 UJ	<0.000862 UJ	<0.000908 UJ	<0.000889 UJ	<0.000881 UJ	<0.00103 UJ	<0.00104 UJ	<0.00107 UJ	<0.00105 UJ	<0.000861 UJ
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	mg/kg	<0.00021 UJ	<0.000199 UJ	<0.000216 U	<0.000215 U	<0.000227 U	<0.000222 UJ	<0.00022 UJ	<0.000258 U	<0.00026 UJ	<0.000267 U	<0.000262 U	<0.000215 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	mg/kg	<0.00021 U	<0.000199 UJ	<0.00054 U	<0.000539 U	<0.000568 U	<0.000556 U	<0.00055 U	<0.000646 U	<0.00065 U	<0.000669 U	<0.000655 U	<0.000538 U
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	mg/kg	<0.0021 U	<0.00199 UJ	<0.00216 U	<0.00215 U	<0.00227 U	<0.00222 U	<0.0022 U	<0.00258 U	<0.0026 U	<0.00267 U	<0.00262 U	<0.00215 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	mg/kg	<0.00021 U	<0.000199 UJ	<0.000216 U	<0.000215 UJ	<0.000227 U	<0.000222 UJ	<0.00022 U	<0.000258 U	<0.00026 U	<0.000267 U	<0.000262 U	<0.000215 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	mg/kg	<0.00021 U	<0.000199 UJ	<0.000216 U	<0.000215 UJ	<0.000227 U	<0.000222 U	<0.00022 U	<0.000258 U	<0.00026 U	<0.000267 U	<0.000262 U	<0.000215 U
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	mg/kg	<0.0021 U	<0.00199 UJ	<0.00216 U	<0.00215 U	<0.00227 U	<0.00222 U	<0.0022 U	<0.00258 U	<0.0026 U	<0.00267 U	<0.00262 U	<0.00215 U
Nonafluoro-3,6-dioxaheptanoic Acid (NFDHA)	151772-58-6	NS	mg/kg	<0.00042 U	<0.000398 UJ	<0.000432 U	<0.000431 U	<0.000454 UJ	<0.000445 U	<0.00044 UJ	<0.000516 U	<0.00052 U	<0.000535 U	<0.000524 UJ	<0.000431 UJ
Perfluoro(2-ethoxyethane)sulfonic Acid (PFEESA)	113507-82-7	NS	mg/kg	<0.000374 U	<0.000398 UJ	<0.000384 U	<0.000384 U	<0.000404 UJ	<0.000396 U	<0.000392 UJ	<0.00046 U	<0.000463 U	<0.000476 U	<0.000466 U	<0.000383 U
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	NS	mg/kg	<0.00042 U	<0.000398 UJ	<0.000432 U	<0.000431 U	<0.000454 UJ	<0.000445 U	<0.00044 UJ	<0.000516 U	<0.00052 U	<0.000535 U	<0.000524 U	<0.000431 U
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	NS	mg/kg	<0.00042 U	<0.000398 UJ	<0.000432 U	<0.000431 U	<0.000454 UJ	<0.000445 U	<0.00044 UJ	<0.000516 U	<0.00052 U	<0.000535 U	<0.000524 U	<0.000431 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	mg/kg	<0.000186 U	<0.000199 UJ	<0.000191 U	<0.000191 U	<0.000201 U	<0.000197 U	<0.000195 U	<0.000229 U	<0.00023 U	<0.000237 U	<0.000232 U	<0.000191 U
Perfluorobutanoic acid (PFBA)	375-22-4	NS	mg/kg	<0.000839 U	<0.000796 UJ	<0.000864 U	<0.000862 U	<0.000908 UJ	<0.000889 U	<0.000881 UJ	<0.00103 U	<0.00104 U	<0.00107 U	<0.00105 U	<0.000861 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	mg/kg	<0.000202 U	<0.000199 UJ	<0.000208 U	<0.000208 UJ	<0.000219 U	<0.000214 U	<0.000212 U	<0.000249 U	<0.000251 U	<0.000258 U	<0.000253 U	<0.000208 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	mg/kg	<0.00021 U	0.000074 J	<0.000216 U	<0.000215 U	<0.000227 U	<0.000222 U	<0.00022 U	<0.000258 U	<0.00026 U	<0.000267 U	<0.000262 U	<0.000215 U
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	mg/kg	<0.000204 U	<0.000199 UJ	<0.000209 U	<0.000209 UJ	<0.00022 U	<0.000216 U	<0.000214 U	<0.00025 U	<0.000252 U	<0.000259 U	<0.000254 U	<0.000209 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	mg/kg	<0.00021 U	0.000022 J	<0.000216 UJ	<0.000215 UJ	<0.000227 UJ	<0.000222 UJ	<0.00022 UJ	<0.000258 U	<0.00026 U	<0.000267 U	<0.000262 U	<0.000215 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	mg/kg	<0.00021 U	<0.000199 UJ	<0.000216 U	<0.000215 UJ	<0.000227 U	<0.000222 U	<0.00022 U	<0.000258 U	<0.00026 U	<0.000267 U	<0.000262 U	<0.000215 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	mg/kg	<0.00021 U	0.000022 J	<0.000216 U	<0.000215 U	<0.000227 UJ	<0.000222 U	<0.00022 UJ	<0.000258 UJ	<0.00026 UJ	<0.000267 UJ	<0.000262 UJ	<0.000215 UJ
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	mg/kg	<0.000192 U	<0.000199 UJ	<0.000198 U	<0.000197 U	<0.000208 U	<0.000203 U	<0.000201 U	<0.000236 U	<0.000238 U	<0.000245 U	<0.00024 U	<0.000197 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	mg/kg	<0.00021 U	0.000047 J	0.000145 J	<0.000215 U	<0.000227 UJ	0.0000753 J	<0.00022 UJ	<0.000258 U	<0.00026 U	<0.000267 U	<0.000262 U	<0.000215 U
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	mg/kg	<0.000201 UJ	<0.000199 UJ	<0.000207 U	<0.000207 UJ	<0.000218 U	<0.000213 U	<0.000211 U	<0.000248 U	<0.00025 U	<0.000257 U	<0.000251 U	<0.000207 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	mg/kg	<0.00021 U	0.000065 J	<0.000216 U	<0.000215 U	<0.000227 U	<0.000222 U	<0.00022 U	<0.000258 U	<0.00026 U	<0.000267 U	<0.000262 U	<0.000215 U
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	mg/kg	<0.00021 U	<0.000199 UJ	<0.000216 U	<0.000215 U	<0.000227 U	<0.000222 U	<0.00022 U	<0.000258 U	<0.00026 U	<0.000267 U	<0.000262 U	<0.000215 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	mg/kg	0.000109 J	0.000499 J	0.000278	0.000689 J	<0.000211 U	<0.000207 U	<0.000205 U	<0.00024 U	<0.000242 U	<0.000249 U	<0.000244 U	0.0000765 J
Perfluorooctanoic Acid (PFOA)	335-67-1	**0.00066**	mg/kg	<0.00021 U	<0.000199 U	0.000293 J	0.000115 J	0.0000936 J	<0.000222 UJ	<0.00022 UJ	<0.000258 U	<0.00026 U	<0.000267 U	<0.000262 U	<0.000215 U
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	NS	mg/kg	<0.000197 U	<0.000199 UJ	<0.000203 U	<0.000203 U	<0.000213 U	<0.000209 U	<0.000207 U	<0.000243 U	<0.000244 U	<0.000251 U	<0.000246 U	<0.000202 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	mg/kg	<0.00042 U	<0.000398 UJ	0.000123 J	<0.000431 U	<0.000454 UJ	0.000122 J	<0.00044 UJ	<0.000516 U	<0.00052 U	<0.000535 U	<0.000524 U	<0.000431 U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	mg/kg	<0.00021 U	<0.000199 UJ	<0.000216 U	<0.000215 U	<0.000227 U	<0.000222 U	<0.00022 U	<0.000258 U	<0.00026 U	<0.000267 U	<0.000262 UJ	<0.000215 UJ
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	mg/kg	<0.00021 U	<0.000199 UJ	<0.000216 U	<0.000215 U	<0.000227 U	<0.000222 U	<0.00022 U	<0.000258 U	<0.00026 U	<0.000267 U	<0.000262 U	<0.000215 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	mg/kg	<0.00021 U	0.000033 J	<0.000216 U	<0.000215 U	<0.000227 U	<0.000222 U	<0.00022 U	<0.000258 U	<0.00026 U	<0.000267 U	<0.000262 U	<0.000215 U

Table 3B
Confirmation Soil Sample Analytical Results Summary - PFAS
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EPSW14	EPSW15	EPSW16	EPSW18	EPSW19	EPSW20	EPSW21	EPSW22	EPSW23	EPSW24	EPSW25	EPSW25	EPSW26
			Sample Name	EPSW14_EL3	EPSW15_EL3	EPSW16_EL3	EPSW18_EL3	EPSW19_EL3	EPSW20_EL3	EPSW21_EL1	EPSW22_EL3	EPSW23_EL3	EPSW24_EL3	EPSW25_EL3	DUP02_051525	EPSW26_EL3
			Sample Date	04/22/2025	04/22/2025	04/16/2025	09/22/2025	09/22/2025	09/22/2025	09/11/2025	08/27/2025	05/15/2025	05/15/2025	05/15/2025	05/15/2025	04/22/2025
			Sample Elevation	3	3	3	3	3	3	1	3	3	3	3	3	3
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances																
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	763051-92-9	NS	mg/kg	<0.0008 U	<0.000794 U	<0.000797 U	<0.00084 U	<0.000777 U	<0.000806 U	<0.000904 U	<0.000831 U	<0.000797 U	<0.000799 U	<0.0008 U	<0.000795 U	<0.000795 U
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2 FTS)	39108-34-4	NS	mg/kg	<0.0008 U	<0.000794 U	<0.000797 U	<0.000853 U	<0.000789 U	<0.000819 U	<0.000918 U	<0.000844 U	<0.000797 U	<0.000799 U	<0.0008 U	<0.000795 U	<0.000795 U
1H,1H,2H,2H-Perfluorohexane Sulfonic Acid (4:2 FTS)	757124-72-4	NS	mg/kg	NA	NA	NA	<0.000833 U	<0.000771 U	<0.0008 U	<0.000897 UJ	<0.000824 U	NA	NA	NA	NA	NA
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	mg/kg	<0.0008 U	<0.000794 U	<0.000797 U	NA	NA	NA	NA	NA	<0.000797 U	<0.000799 U	<0.0008 U	<0.000795 U	<0.000795 U
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2 FTS)	27619-97-2	NS	mg/kg	<0.0008 U	<0.000794 U	<0.000797 U	<0.000844 U	<0.000781 U	<0.00081 U	<0.000909 U	<0.000835 U	<0.000797 U	<0.000799 U	<0.0008 U	<0.000795 U	<0.000795 U
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3 FTCA)	914637-49-3	NS	mg/kg	<0.005 U	<0.00496 U	<0.00498 U	<0.00555 U	<0.00514 U	<0.00533 U	<0.00598 U	<0.00549 U	<0.00498 U	<0.00499 U	<0.005 U	<0.00497 U	<0.00497 U
3-Perfluoroheptyl Propanoic Acid (7:3 FTCA)	812-70-4	NS	mg/kg	<0.005 U	<0.00496 U	<0.00498 U	<0.00555 U	<0.00514 U	<0.00533 U	<0.00598 U	<0.00549 U	<0.00498 U	<0.00499 U	<0.005 U	<0.00497 U	<0.00497 U
3-Perfluoropropyl Propanoic Acid (3:3 FTCA)	356-02-5	NS	mg/kg	<0.001 U	<0.000992 U	<0.000996 U	<0.00111 U	<0.00103 U	<0.00107 U	<0.0012 U	<0.0011 U	<0.000997 U	<0.000998 U	<0.001 U	<0.000994 U	<0.000994 U
4,8-Dioxa-3H-perfluorononanoic Acid (ADONA)	919005-14-4	NS	mg/kg	<0.0008 U	<0.000794 U	<0.000797 U	<0.00084 U	<0.000777 U	<0.000806 U	<0.000904 U	<0.000831 U	<0.000797 U	<0.000799 U	<0.0008 U	<0.000795 U	<0.000795 U
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	756426-58-1	NS	mg/kg	<0.0008 U	<0.000794 U	<0.000797 U	<0.000831 UJ	<0.000769 UJ	<0.000798 UJ	<0.000894 UJ	<0.000822 UJ	<0.000797 U	<0.000799 U	<0.0008 U	<0.000795 U	<0.000795 U
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	mg/kg	<0.0008 U	<0.000794 U	<0.000797 U	<0.000889 U	<0.000822 U	<0.000853 U	<0.000956 UJ	<0.000879 UJ	<0.000797 U	<0.000799 U	<0.0008 U	<0.000795 U	<0.000795 U
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	mg/kg	<0.0002 U	<0.000198 U	<0.000199 U	<0.000222 U	<0.000206 U	<0.000213 U	<0.000239 U	<0.00022 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	mg/kg	<0.0002 U	<0.000198 U	<0.000199 U	<0.000555 U	<0.000514 U	<0.000533 U	<0.000598 U	<0.000549 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	mg/kg	<0.002 U	<0.00198 U	<0.00199 U	<0.00222 U	0.00115 J	<0.00213 U	<0.00239 U	<0.0022 U	<0.00199 U	<0.002 U	<0.002 U	<0.00199 U	<0.00199 U
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	mg/kg	<0.0002 U	<0.000198 U	<0.000199 U	<0.000222 U	<0.000206 U	<0.000213 U	<0.000239 U	<0.00022 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	mg/kg	<0.0002 U	<0.000198 U	<0.000199 UJ	<0.000222 U	<0.000206 U	<0.000213 U	<0.000239 U	<0.00022 UJ	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	mg/kg	<0.002 U	<0.00198 U	<0.00199 U	<0.00222 U	<0.00206 U	<0.00213 U	<0.00239 U	<0.0022 U	<0.00199 U	<0.002 U	<0.002 U	<0.00199 U	<0.00199 U
Nonafluoro-3,6-dioxaheptanoic Acid (NFDHA)	151772-58-6	NS	mg/kg	<0.0004 U	<0.000397 U	<0.000398 U	<0.000444 U	<0.000411 U	<0.000427 U	<0.000478 U	<0.00044 U	<0.000399 U	<0.000399 U	<0.0004 U	<0.000397 U	<0.000397 U
Perfluoro(2-ethoxyethane)sulfonic Acid (PFEESA)	113507-82-7	NS	mg/kg	<0.0004 U	<0.000397 U	<0.000398 U	<0.000395 U	<0.000366 U	<0.00038 U	<0.000426 U	<0.000391 U	<0.000399 U	<0.000399 U	<0.0004 U	<0.000397 U	<0.000397 U
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	NS	mg/kg	<0.0004 U	<0.000397 U	<0.000398 U	<0.000444 U	<0.000411 U	<0.000427 U	<0.000478 U	<0.00044 U	<0.000399 U	<0.000399 U	<0.0004 U	<0.000397 U	<0.000397 U
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	NS	mg/kg	<0.0004 U	<0.000397 U	<0.000398 U	<0.000444 U	<0.000411 U	<0.000427 U	<0.000478 U	<0.00044 U	<0.000399 U	<0.000399 U	<0.0004 U	<0.000397 U	<0.000397 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	mg/kg	<0.0002 U	<0.000198 U	<0.000199 U	<0.000197 UJ	<0.000182 U	<0.000189 U	<0.000212 U	<0.000195 UJ	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
Perfluorobutanoic acid (PFBA)	375-22-4	NS	mg/kg	<0.0008 U	<0.000794 U	<0.000797 U	<0.000889 U	<0.000822 U	<0.000853 U	<0.000956 U	<0.000879 U	<0.000797 U	<0.000799 U	<0.0008 U	<0.000795 U	0.000033 J
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	mg/kg	<0.0002 U	<0.000198 U	<0.000199 U	<0.000214 U	<0.000198 U	<0.000206 U	<0.000231 U	<0.000212 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	mg/kg	<0.0002 U	<0.000198 U	<0.000199 U	<0.000222 U	<0.000206 U	<0.000213 U	<0.000239 U	<0.00022 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	mg/kg	<0.0002 U	<0.000198 U	<0.000199 U	<0.000215 U	<0.000199 U	<0.000207 U	<0.000232 U	<0.000213 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	mg/kg	<0.0002 U	<0.000198 U	<0.000199 U	<0.000222 U	<0.000206 U	<0.000213 U	<0.000239 UJ	<0.00022 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	mg/kg	<0.0002 U	<0.000198 U	<0.000199 U	<0.000222 U	<0.000206 U	<0.000213 U	<0.000239 UJ	<0.00022 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	mg/kg	<0.0002 U	0.000013 J	0.000018 J	<0.000222 U	<0.000206 U	<0.000213 U	<0.000239 U	<0.00022 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	mg/kg	<0.0002 U	0.000022 J	<0.000199 U	<0.000203 UJ	<0.000188 U	<0.000195 U	<0.000219 U	<0.000201 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	mg/kg	<0.0002 U	<0.000198 U	<0.000199 U	<0.000222 U	<0.000206 U	<0.000213 U	<0.000239 U	<0.00022 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	mg/kg	<0.0002 U	<0.000198 U	<0.000199 U	<0.000213 U	<0.000197 U	<0.000205 U	<0.00023 UJ	<0.000211 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	mg/kg	0.000025 J	<0.000198 U	<0.000199 U	<0.000222 U	<0.000206 U	<0.000213 U	<0.000239 U	<0.00022 UJ	<0.000199 U	<0.0002 U	0.000035 J	0.000057 J	<0.000199 U
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	mg/kg	0.000014 J	<0.000198 U	<0.000199 U	0.00012 J	0.000125 J	<0.000213 U	<0.000239 U	<0.00022 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	mg/kg	0.000404	0.000167 J	0.000213	0.000229	0.000206	<0.000198 U	<0.000222 UJ	**0.001**	0.000391	0.000046 J	0.000201	0.000361	0.000192 J
Perfluorooctanoic Acid (PFOA)	335-67-1	**0.00066**	mg/kg	0.000093 J	0.00024	0.000238	<0.000222 U	<0.000206 U	<0.000213 U	<0.000239 U	<0.00022 U	0.000242	0.000062 J	0.000063 J	0.000139 J	0.0002
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	NS	mg/kg	<0.0002 U	<0.000198 U	<0.000199 U	<0.000209 UJ	<0.000193 U	<0.0002 U	<0.000225 U	<0.000207 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	mg/kg	<0.0004 U	<0.000397 U	<0.000398 U	<0.000444 U	<0.000411 U	<0.000427 U	<0.000478 U	<0.00044 U	<0.000399 U	<0.000399 U	<0.0004 U	<0.000397 U	<0.000397 U
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	mg/kg	<0.0002 U	<0.000198 U	<0.000199 U	<0.000222 U	<0.000206 U	<0.000213 U	<0.000239 U	<0.00022 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	mg/kg	<0.0002 U	<0.000198 U	<0.000199 U	<0.000222 U	<0.000206 U	<0.000213 U	<0.000239 UJ	<0.00022 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	mg/kg	0.00002 J	<0.000198 U	<0.000199 U	<0.000222 U	<0.000206 U	<0.000213 U	<0.000239 U	<0.00022 U	<0.000199 U	<0.0002 U	<0.0002 U	<0.000199 U	<0.000199 U

Table 3B
Confirmation Soil Sample Analytical Results Summary - PFAS
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	Location	EPSW27	EPSW28	EPSW29	EPSW31
			Sample Name	EPSW27_EL1	EPSW28_EL1	EPSW29_EL1	EPSW31_EL2
			Sample Date	09/11/2025	09/11/2025	09/11/2025	05/01/2025
			Sample Elevation	1	1	1	2
			Unit	Result	Result	Result	Result
Per- and Polyfluoroalkyl Substances							
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS)	763051-92-9	NS	mg/kg	<0.000822 U	<0.000993 U	<0.000844 U	<0.000797 UJ
1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2 FTS)	39108-34-4	NS	mg/kg	<0.000835 U	<0.00101 U	<0.000857 U	<0.000797 UJ
1H,1H,2H,2H-Perfluorohexane Sulfonic Acid (4:2 FTS)	757124-72-4	NS	mg/kg	<0.000815 UJ	<0.000986 U	<0.000837 UJ	NA
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	6HPFHXSA	NS	mg/kg	NA	NA	NA	<0.000797 UJ
1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2 FTS)	27619-97-2	NS	mg/kg	<0.000826 U	<0.000999 U	<0.000849 U	<0.000797 UJ
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3 FTCA)	914637-49-3	NS	mg/kg	<0.00543 U	<0.00657 U	<0.00558 U	<0.00498 UJ
3-Perfluoroheptyl Propanoic Acid (7:3 FTCA)	812-70-4	NS	mg/kg	<0.00543 U	<0.00657 U	<0.00558 U	<0.00498 UJ
3-Perfluoropropyl Propanoic Acid (3:3 FTCA)	356-02-5	NS	mg/kg	<0.00109 U	<0.00131 U	<0.00112 U	<0.000996 UJ
4,8-Dioxa-3H-perfluorononanoic Acid (ADONA)	919005-14-4	NS	mg/kg	<0.000822 U	<0.000993 U	<0.000844 U	<0.000797 UJ
9-Chlorohexadecafluoro-3-Oxanonane-1-Sulfonic Acid (9Cl-PF3ONS)	756426-58-1	NS	mg/kg	<0.000813 UJ	<0.000983 UJ	<0.000835 UJ	<0.000797 UJ
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	13252-13-6	NS	mg/kg	<0.00087 UJ	<0.00105 UJ	<0.000893 UJ	<0.000797 UJ
N-ethyl Perfluorooctanesulfonamide (NEtFOSA)	4151-50-2	NS	mg/kg	<0.000217 U	<0.000263 U	<0.000223 U	<0.000199 UJ
N-ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	mg/kg	<0.000543 U	<0.000657 U	<0.000558 U	<0.000199 UJ
N-ethyl Perfluorooctanesulfonamidoethanol (NEtFOSE)	1691-99-2	NS	mg/kg	<0.00217 U	<0.00263 U	<0.00223 U	<0.00199 UJ
N-methyl Perfluorooctanesulfonamide (NMeFOSA)	31506-32-8	NS	mg/kg	<0.000217 U	<0.000263 U	<0.000223 U	<0.000199 UJ
N-methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	mg/kg	<0.000217 U	<0.000263 U	<0.000223 U	<0.000199 UJ
N-methyl Perfluorooctanesulfonamidoethanol (NMeFOSE)	24448-09-7	NS	mg/kg	<0.00217 U	<0.00263 U	<0.00223 U	<0.00199 UJ
Nonafluoro-3,6-dioxaheptanoic Acid (NFDHA)	151772-58-6	NS	mg/kg	<0.000435 U	<0.000526 U	<0.000447 U	<0.000398 UJ
Perfluoro(2-ethoxyethane)sulfonic Acid (PFEESA)	113507-82-7	NS	mg/kg	<0.000387 U	<0.000468 U	<0.000397 U	<0.000398 UJ
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	NS	mg/kg	<0.000435 U	<0.000526 U	<0.000447 U	<0.000398 UJ
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	NS	mg/kg	<0.000435 U	<0.000526 U	<0.000447 U	<0.000398 UJ
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	mg/kg	<0.000192 U	<0.000233 U	<0.000198 U	<0.000199 UJ
Perfluorobutanoic acid (PFBA)	375-22-4	NS	mg/kg	<0.00087 U	<0.00105 U	<0.000893 U	<0.000797 UJ
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	mg/kg	<0.00021 U	<0.000254 U	<0.000215 U	<0.000199 UJ
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	mg/kg	<0.000217 U	<0.000263 U	<0.000223 U	<0.000199 UJ
Perfluorododecanesulfonic Acid (PFDoS)	79780-39-5	NS	mg/kg	<0.000211 U	<0.000255 U	<0.000217 U	<0.000199 UJ
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	mg/kg	<0.000217 UJ	<0.000263 UJ	<0.000223 UJ	<0.000199 UJ
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	mg/kg	<0.000217 UJ	<0.000263 UJ	<0.000223 UJ	<0.000199 UJ
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	mg/kg	<0.000217 U	<0.000263 U	<0.000223 U	<0.000199 UJ
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	mg/kg	<0.000199 U	<0.00024 U	<0.000204 U	<0.000199 UJ
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	mg/kg	<0.000217 U	<0.000263 U	<0.000223 U	<0.000199 UJ
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	NS	mg/kg	<0.000209 UJ	<0.000252 UJ	<0.000214 UJ	<0.000199 UJ
Perfluorononanoic Acid (PFNA)	375-95-1	NS	mg/kg	<0.000217 U	<0.000263 U	<0.000223 U	<0.000199 UJ
Perfluorooctanesulfonamide (PFOSA)	754-91-6	NS	mg/kg	<0.000217 U	<0.000263 U	<0.000223 U	<0.000199 UJ
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	**0.00088**	mg/kg	**0.000945 J**	0.000551 J	0.000221 J	0.000066 J
Perfluorooctanoic Acid (PFOA)	335-67-1	**0.00066**	mg/kg	<0.000217 U	<0.000263 U	<0.000223 U	0.000051 J
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	NS	mg/kg	<0.000204 U	<0.000247 U	<0.00021 U	<0.000199 UJ
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	mg/kg	<0.000435 U	<0.000526 U	<0.000447 U	<0.000398 UJ
Perfluorotetradecanoic Acid (PFTeDA)	376-06-7	NS	mg/kg	<0.000217 U	<0.000263 U	<0.000223 U	<0.000199 UJ
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	mg/kg	<0.000217 UJ	<0.000263 UJ	<0.000223 UJ	<0.000199 UJ
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	mg/kg	<0.000217 U	<0.000263 U	<0.000223 U	<0.000199 UJ

Table 3B
Confirmation Soil Sample Analytical Results Summary - PFAS
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Notes:
CAS - Chemical Abstract Service
NS - No standard
mg/kg - milligram per kilogram
NA - Not analyzed
RL - Reporting limit
<RL - Not detected

Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Part 375 Remedial Programs Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS) Unrestricted Use Guidance Values (April 2023).

Qualifiers:
J - The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
UJ - The analyte was not detected at a level greater than or equal to the RL; however, the reported RL is approximate and may be inaccurate or imprecise.
U - The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the RL or the sample concentration for results impacted by blank contamination.

Exceedance Summary:
10 - Result exceeds Unrestricted Use SCOs

Table 4
Post-Remedial Groundwater Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Analyte	CAS Number	NYSDEC SGVs	Location	RMW01	RMW01	RMW02	RMW03	RMW04	RMW05	RMW06	RMW07	RMW08	RMW09	RMW10
			Sample Name	RMW01_091825	DUP01_091825	RMW02_091825	RMW03_091825	RMW04_091925	RMW05_091825	RMW06_091925	RMW07_091925	RMW08_091825	RMW09_091925	RMW10_091925
			Sample Date	09/18/2025	09/18/2025	09/18/2025	09/18/2025	09/19/2025	09/18/2025	09/19/2025	09/19/2025	09/18/2025	09/19/2025	09/19/2025
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds														
1,2,4-Trimethylbenzene	95-63-6	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Benzene	71-43-2	1	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Cymene	99-87-6	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Ethylbenzene	100-41-4	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Isopropylbenzene (Cumene)	98-82-8	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
M,P-Xylene	179601-23-1	5	ug/l	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
Naphthalene	91-20-3	10	ug/l	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
n-Butylbenzene	104-51-8	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
n-Propylbenzene	103-65-1	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Sec-Butylbenzene	135-98-8	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
T-Butylbenzene	98-06-6	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Tert-Butyl Methyl Ether	1634-04-4	10	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	1.67
Toluene	108-88-3	5	ug/l	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Total Xylenes	1330-20-7	5	ug/l	<1.5 U	<1.5 U	<1.5 U	<1.5 U	<1.5 U	<1.5 U	<1.5 U	<1.5 U	<1.5 U	<1.5 U	<1.5 U

Table 4
Post-Remedial Groundwater Sample Analytical Results
Site Management Plan

1709 Surf Avenue
Brooklyn, New York
Langan Project No.: 170747001
BCP Site No. C224398

Notes:
CAS - Chemical Abstract Service
NS - No standard
ug/l - microgram per liter
NA - Not analyzed
RL - Reporting limit
<RL - Not detected
Groundwater sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 Codes, Rules, and Regulations (NYCRR) Part 703.5 and the NYSDEC Technical and Operation Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values for Class GA Water and published addenda (herein collectively referenced as "NYSDEC SGVs").

Qualifiers:
U - The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the RL or the sample concentration for results impacted by blank contamination.

Exceedance Summary:
10 - Result exceeds NYSDEC SGVs

FIGURES



Legend

Approximate Site Boundary

2,000 0 2,000

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Notes:
1. Basemap adapted from United States Geological Survey (USGS) 7.5-Minute Series Topographical Maps, Coney Island, New York, Quadrangle.

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Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC

Collectively known as Langan

Project	1709 SURF AVE BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27 BROOKLYN KINGS COUNTY NEW YORK
Figure Title	SITE LOCATION MAP
Project No.	170747001
Date	8/3/2023
Scale	1"=2,000'
Drawn By	GS
Figure No.	1

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Legend

- Approximate Site Boundary
- Tax Parcel

Notes:
1. Aerial imagery provided through Langan's subscription to NearMap.com, flown 5/28/2023.
2. Parcel data provided by the New York City Department of City Planning.

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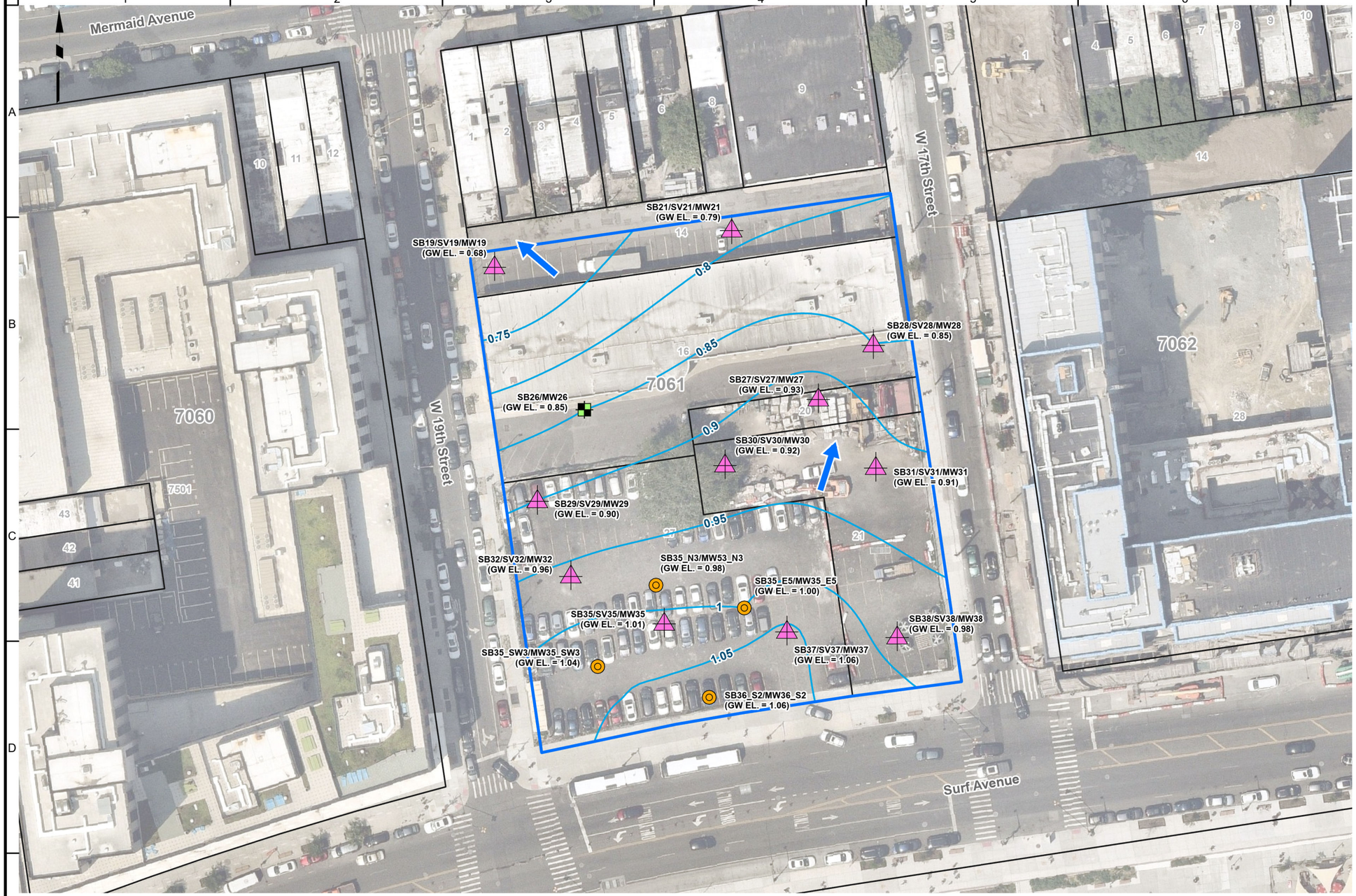
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BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
SITE PLAN

Project No.	170747001
Date	8/3/2023
Scale	1"=60'
Drawn By	GS
Figure No.	2

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Legend

- Approximate Site Boundary
- Tax Parcel
- Groundwater Flow Direction
- Groundwater Elevation Contour (0.05-ft. intervals)
- RI Soil Boring and Co-Located Monitoring Well
- RI Soil Boring, Monitoring Well, and Co-Located Soil Vapor Point Location
- Petroleum Impact Delineation Boring/ Monitoring Well Location

Notes:
1. Aerial imagery provided through Langan's subscription to NearMap.com, flown 5/28/2023.
2. Parcel data provided by the New York City Department of City Planning.
3. Groundwater elevations are provided at each well location based on a survey performed by Langan on 5/31/2023. All elevations are referenced in the North American Vertical Datum of 1988 (NAVD88).
4. Elevations for the top of monitoring well casing (TOMWC) were taken on the side of the PVC monitoring well casing noted.
5. Depth to groundwater measurements were obtained during a synoptic gauging event performed June 27, 2023.

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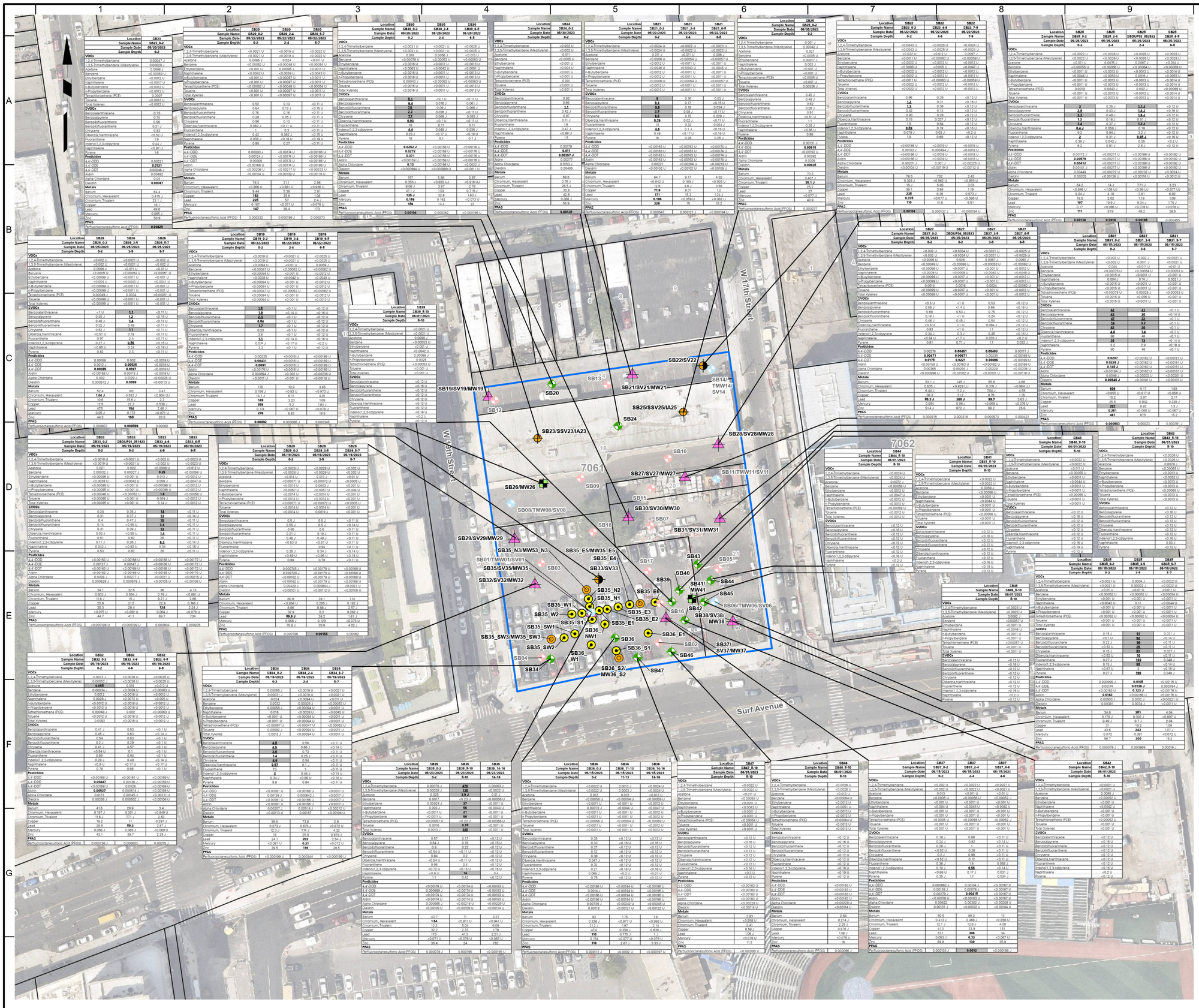
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Figure Title
GROUNDWATER CONTOUR MAP

Project No.	170747001
Date	8/3/2023
Scale	1"=60'
Drawn By	GS

Figure No. 3

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Analyte	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groutwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs
VOCs			
1,2,4-Trimethylbenzene	3.6	3.6	52
1,3,5-Trimethylbenzene (Mesitylene)	8.4	8.4	52
Acetone	0.05	0.05	100
Benzene	0.06	0.06	4.8
Ethylbenzene	1	1	41
Naphthalene	12	12	100
n-Butylbenzene	12	12	100
n-Propylbenzene	3.9	3.9	100
Tetrachloroethene (PCE)	1.3	1.3	19
Toluene	0.7	0.7	100
Total Xylenes	0.26	1.6	100
SVOCs			
Benzo(a)anthracene	1	1	1
Benzo(a)pyrene	1	22	1
Benzo(b)fluoranthene	1	1.7	1
Benzo(k)fluoranthene	0.8	1.7	3.9
Chrysene	1	1	3.9
Dibenz(a,h)anthracene	0.33	1000	0.33
Fluoranthene	100	1000	100
Indeno(1,2,3-cd)pyrene	0.5	8.2	0.5
Naphthalene	12	12	100
Pyrene	100	1000	100
Pesticides			
4,4'-DDD	0.0033	14	13
4,4'-DDE	0.0033	17	8.9
4,4'-DDT	0.0033	136	7.9
Aldrin	0.005	0.19	0.097
Alpha Chlordane	0.094	2.9	4.2
Dieldrin	0.005	0.1	0.2
Metals			
Barium	350	820	400
Chromium, Hexavalent	1	19	110
Chromium, Trivalent	30	NS	180
Copper	50	1720	270
Lead	63	450	400
Mercury	0.18	0.73	0.81
Zinc	109	2480	10000
PFAS			
Perfluorooctanesulfonic Acid (PFOS)	0.00088	0.001	0.044

Exceedance Summary:

10 - Result exceeds Unrestricted Use SCOs
10 - Result exceeds Protection of Groundwater SCOs
10 - Result exceeds Restricted Use Restricted-Residential SCOs

Notes:
1. Aerial imagery provided through Langan's subscription to NearMap.com, flown 5/28/2023.
2. Parcel data provided by the New York City Department of City Planning.
3. All features shown are approximate.
4. Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 of the Official Compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use, Protection of Groundwater, and Restricted Use Restricted-Residential Soil Cleanup Objectives (SCO).
5. Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Part 375 Remedial Programs Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS) Unrestricted Use, Restricted Use Restricted-Residential, and Protection of Groundwater Guidance Values (April 2023).
6. Criterion comparisons for 3- & 4-methylphenol (m&p cresol) are provided for reference. Promulgated SCOs are for 3-methylphenol (m-cresol) and 4-methylphenol (p-cresol).
7. The analytical results for samples collected from the petroleum-impacted delineation borings are shown on Figure 8B.
8. Analytical LSI data is provided in a separate LSI report.
9. LSI - Limited Subsurface Investigation
10. RI - Remedial Investigation
11. RL - Reporting Limit
12. All units are in mg/kg (milligrams per kilogram)
13. NS - No Standard

Qualifiers:
J - The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
UJ - The analyte was not detected at a level greater than or equal to the RL; however, the reported RL is approximate and may be inaccurate or imprecise.
U - The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the RL or the sample concentration for results impacted by blank contamination.

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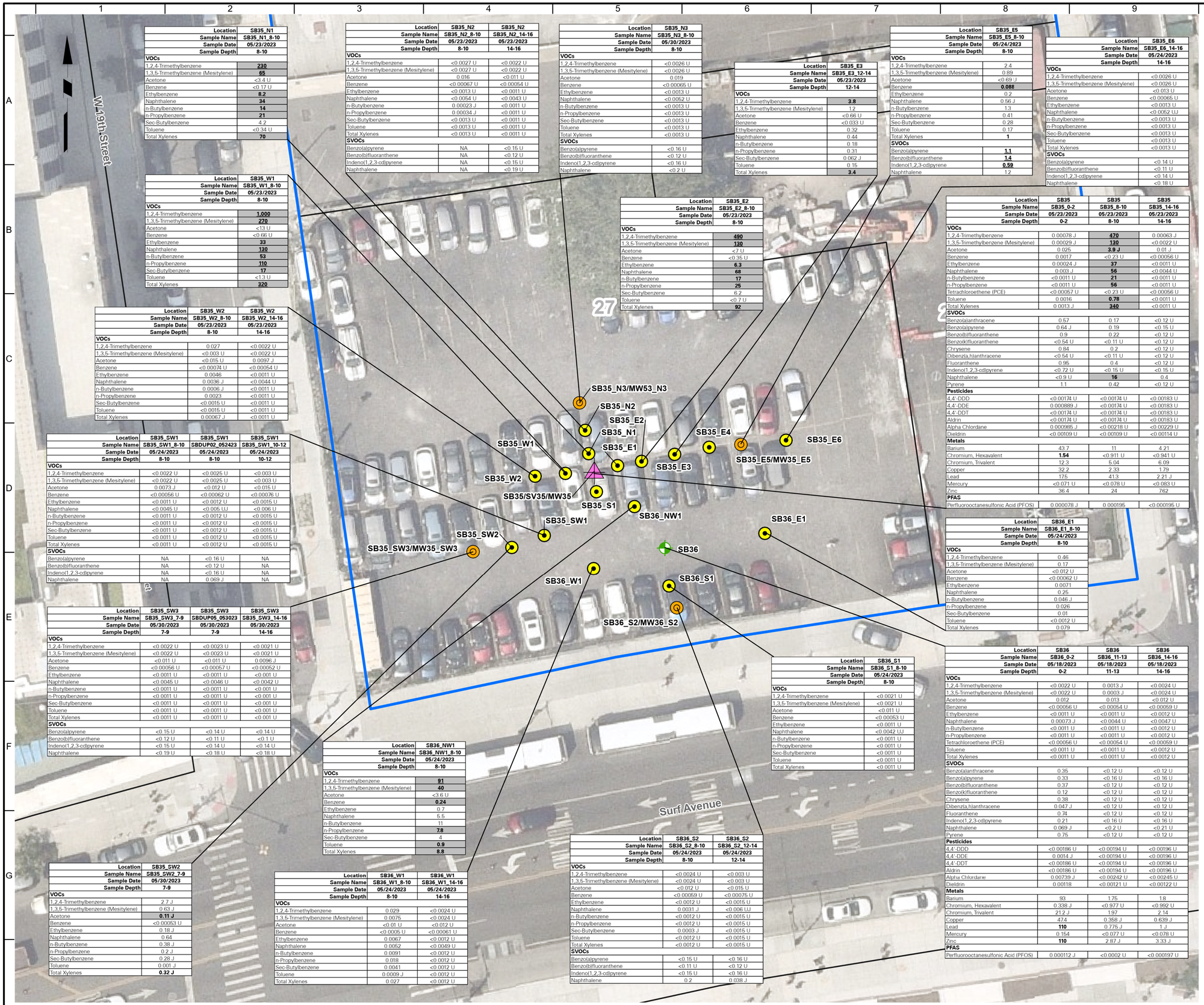
Figure Title
RI SOIL SAMPLE ANALYTICAL RESULTS MAP

Project No.	170747001
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Figure No.	4A

PROJECT No. 170747001

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Location	SB35_N1
Sample Name	SB35_N1_8-10
Sample Date	05/23/2023
Sample Depth	8-10
VOCs	
1,2,4-Trimethylbenzene	**230**
1,3,5-Trimethylbenzene (Mesitylene)	**65**
Acetone	<3.4 U
Benzene	<0.17 U
Ethylbenzene	**8.2**
Naphthalene	**34**
n-Butylbenzene	**14**
n-Propylbenzene	**21**
Sec-Butylbenzene	4.2
Toluene	<0.34 U
Total Xylenes	**70**

Location	SB35_N2	SB35_N2
Sample Name	SB35_N2_8-10	SB35_N2_14-16
Sample Date	05/23/2023	05/23/2023
Sample Depth	8-10	14-16
VOCs		
1,2,4-Trimethylbenzene	<0.0027 U	<0.0022 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.0027 U	<0.0022 U
Acetone	0.016	<0.011 U
Benzene	<0.00067 U	<0.00054 U
Ethylbenzene	<0.0013 U	<0.0011 U
Naphthalene	<0.0054 U	<0.0043 U
n-Butylbenzene	0.00023 J	<0.0011 U
n-Propylbenzene	0.00034 J	<0.0011 U
Sec-Butylbenzene	<0.0013 U	<0.0011 U
Toluene	<0.0013 U	<0.0011 U
Total Xylenes	<0.0013 U	<0.0011 U
SVOCs		
Benzo(a)pyrene	NA	<0.15 U
Benzo(b)fluoranthene	NA	<0.12 U
Indeno(1,2,3-cd)pyrene	NA	<0.15 U
Naphthalene	NA	<0.19 U

Location	SB35_N3
Sample Name	SB35_N3_8-10
Sample Date	05/30/2023
Sample Depth	8-10
VOCs	
1,2,4-Trimethylbenzene	<0.0026 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.0026 U
Acetone	0.019
Benzene	<0.00065 U
Ethylbenzene	<0.0013 U
Naphthalene	<0.0052 U
n-Butylbenzene	<0.0013 U
n-Propylbenzene	<0.0013 U
Sec-Butylbenzene	<0.0013 U
Toluene	<0.0013 U
Total Xylenes	<0.0013 U
SVOCs	
Benzo(a)pyrene	<0.16 U
Benzo(b)fluoranthene	<0.12 U
Indeno(1,2,3-cd)pyrene	<0.16 U
Naphthalene	<0.2 U

Location	SB35_E3
Sample Name	SB35_E3_12-14
Sample Date	05/23/2023
Sample Depth	12-14
VOCs	
1,2,4-Trimethylbenzene	**3.8**
1,3,5-Trimethylbenzene (Mesitylene)	1.2
Acetone	<0.66 U
Benzene	<0.033 U
Ethylbenzene	0.32
Naphthalene	0.44
n-Butylbenzene	0.18
n-Propylbenzene	0.31
Sec-Butylbenzene	0.062 J
Toluene	0.15
Total Xylenes	**3.4**

Location	SB35_E5
Sample Name	SB35_E5_8-10
Sample Date	05/24/2023
Sample Depth	8-10
VOCs	
1,2,4-Trimethylbenzene	2.4
1,3,5-Trimethylbenzene (Mesitylene)	0.89
Acetone	<0.69 U
Benzene	**0.088**
Ethylbenzene	0.2
Naphthalene	0.56 J
n-Butylbenzene	1.3
n-Propylbenzene	0.41
Sec-Butylbenzene	0.28
Toluene	0.17
Total Xylenes	**1**
SVOCs	
Benzo(a)pyrene	**1.1**
Benzo(b)fluoranthene	**1.4**
Indeno(1,2,3-cd)pyrene	**0.59**
Naphthalene	1.2

Location	SB35_E6
Sample Name	SB35_E6_14-16
Sample Date	05/24/2023
Sample Depth	14-16
VOCs	
1,2,4-Trimethylbenzene	<0.0026 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.0026 U
Acetone	<0.013 U
Benzene	<0.00065 U
Ethylbenzene	<0.0013 U
Naphthalene	<0.0052 UJ
n-Butylbenzene	<0.0013 U
n-Propylbenzene	<0.0013 U
Sec-Butylbenzene	<0.0013 U
Toluene	<0.0013 U
Total Xylenes	<0.0013 U
SVOCs	
Benzo(a)pyrene	<0.14 U
Benzo(b)fluoranthene	<0.11 U
Indeno(1,2,3-cd)pyrene	<0.14 U
Naphthalene	<0.18 U

Location	SB35_W1
Sample Name	SB35_W1_8-10
Sample Date	05/23/2023
Sample Depth	8-10
VOCs	
1,2,4-Trimethylbenzene	**1,000**
1,3,5-Trimethylbenzene (Mesitylene)	**270**
Acetone	<13 U
Benzene	<0.66 U
Ethylbenzene	**33**
Naphthalene	**130**
n-Butylbenzene	**53**
n-Propylbenzene	**110**
Sec-Butylbenzene	**17**
Toluene	<1.3 U
Total Xylenes	**320**

Location	SB35_E2
Sample Name	SB35_E2_8-10
Sample Date	05/23/2023
Sample Depth	8-10
VOCs	
1,2,4-Trimethylbenzene	**490**
1,3,5-Trimethylbenzene (Mesitylene)	**130**
Acetone	<7 U
Benzene	<0.35 U
Ethylbenzene	**6.3**
Naphthalene	**68**
n-Butylbenzene	**17**
n-Propylbenzene	**25**
Sec-Butylbenzene	6.2
Toluene	<0.7 U
Total Xylenes	**92**

Location	SB35	SB35	SB35
Sample Name	SB35_0-2	SB35_8-10	SB35_14-16
Sample Date	05/23/2023	05/23/2023	05/23/2023
Sample Depth	0-2	8-10	14-16
VOCs			
1,2,4-Trimethylbenzene	0.00078 J	**470**	0.00063 J
1,3,5-Trimethylbenzene (Mesitylene)	0.00029 J	**130**	<0.0022 U
Acetone	0.025	**3.9 J**	0.01 J
Benzene	0.0017	<0.23 U	<0.00056 U
Ethylbenzene	0.00024 J	**37**	<0.0011 U
Naphthalene	0.003 J	**56**	<0.0044 U
n-Butylbenzene	<0.0011 U	**21**	<0.0011 U
n-Propylbenzene	<0.0011 U	**56**	<0.0011 U
Tetrachloroethene (PCE)	<0.00057 U	<0.23 U	<0.00056 U
Toluene	0.0016	**0.78**	<0.0011 U
Total Xylenes	0.0013 J	**340**	<0.0011 U
SVOCs			
Benzo(a)anthracene	0.57	0.17	<0.12 U
Benzo(a)pyrene	0.64 J	0.19	<0.15 U
Benzo(b)fluoranthene	0.9	0.22	<0.12 U
Benzo(k)fluoranthene	<0.54 U	<0.11 U	<0.12 U
Chrysene	0.84	0.2	<0.12 U
Dibenz(a,h)anthracene	<0.54 U	<0.11 U	<0.12 U
Fluoranthene	0.95	0.4	<0.12 U
Indeno(1,2,3-cd)pyrene	<0.72 U	<0.15 U	<0.15 U
Naphthalene	<0.9 U	**16**	0.4
Pyrene	1.1	0.42	<0.12 U
Pesticides			
4,4'-DDD	<0.00174 U	<0.00174 U	<0.00183 U
4,4'-DDE	0.000889 J	<0.00174 U	<0.00183 U
4,4'-DDT	<0.00174 U	<0.00174 U	<0.00183 U
Aldrin	<0.00174 U	<0.00174 U	<0.00183 U
Alpha Chlordane	0.000985 J	<0.00218 U	<0.00229 U
Dieldrin	<0.00109 U	<0.00109 U	<0.00114 U
Metals			
Barium	43.7	11	4.21
Chromium, Hexavalent	**1.54**	<0.911 U	<0.941 U
Chromium, Trivalent	12.3	5.04	6.09
Copper	32.2	2.33	1.79
Lead	175	41.3	2.21 J
Mercury	<0.071 U	<0.078 U	<0.083 U
Zinc	36.4	24	7.62
PFAS			
Perfluorooctanesulfonic Acid (PFOS)	0.000078 J	0.000195	<0.000195 U

Location	SB35_W2	SB35_W2
Sample Name	SB35_W2_8-10	SB35_W2_14-16
Sample Date	05/23/2023	05/23/2023
Sample Depth	8-10	14-16
VOCs		
1,2,4-Trimethylbenzene	0.027	<0.0022 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.003 U	<0.0022 U
Acetone	<0.015 U	0.0097 J
Benzene	<0.00074 U	<0.00054 U
Ethylbenzene	0.0046	<0.0011 U
Naphthalene	0.0036 J	<0.0044 U
n-Butylbenzene	0.0006 J	<0.0011 U
n-Propylbenzene	0.0023	<0.0011 U
Sec-Butylbenzene	<0.0015 U	<0.0011 U
Toluene	<0.0015 U	<0.0011 U
Total Xylenes	0.00067 J	<0.0011 U

Location	SB35_SW1	SB35_SW1	SB35_SW1
Sample Name	SB35_SW1_8-10	SBDUP02_052423	SB35_SW1_10-12
Sample Date	05/24/2023	05/24/2023	05/24/2023
Sample Depth	8-10	8-10	10-12
VOCs			
1,2,4-Trimethylbenzene	<0.0022 U	<0.0025 U	<0.003 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.0022 U	<0.0025 U	<0.003 U
Acetone	0.0073 J	<0.012 U	<0.015 U
Benzene	<0.00056 U	<0.00062 U	<0.00076 U
Ethylbenzene	<0.0011 U	<0.0012 U	<0.0015 U
Naphthalene	<0.0045 U	<0.005 U	<0.006 U
n-Butylbenzene	<0.0011 U	<0.0012 U	<0.0015 U
n-Propylbenzene	<0.0011 U	<0.0012 U	<0.0015 U
Sec-Butylbenzene	<0.0011 U	<0.0012 U	<0.0015 U
Toluene	<0.0011 U	<0.0012 U	<0.0015 U
Total Xylenes	<0.0011 U	<0.0012 U	<0.0015 U
SVOCs			
Benzo(a)pyrene	NA	<0.16 U	NA
Benzo(b)fluoranthene	NA	<0.12 U	NA
Indeno(1,2,3-cd)pyrene	NA	<0.16 U	NA
Naphthalene	NA	0.069 J	NA

Location	SB35_SW3	SB35_SW3	SB35_SW3
Sample Name	SB35_SW3_7-9	SBDUP05_053023	SB35_SW3_14-16
Sample Date	05/30/2023	05/30/2023	05/30/2023
Sample Depth	7-9	7-9	14-16
VOCs			
1,2,4-Trimethylbenzene	<0.0022 U	<0.0023 U	<0.0021 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.0022 U	<0.0023 U	<0.0021 U
Acetone	<0.011 U	<0.011 U	0.0096 J
Benzene	<0.00056 U	<0.00057 U	<0.00052 U
Ethylbenzene	<0.0011 U	<0.0011 U	<0.001 U
Naphthalene	<0.0045 U	<0.0046 U	<0.0042 U
n-Butylbenzene	<0.0011 U	<0.0011 U	<0.001 U
n-Propylbenzene	<0.0011 U	<0.0011 U	<0.001 U
Sec-Butylbenzene	<0.0011 U	<0.0011 U	<0.001 U
Toluene	<0.0011 U	<0.0011 U	<0.001 U
Total Xylenes	<0.0011 U	<0.0011 U	<0.001 U
SVOCs			
Benzo(a)pyrene	<0.15 U	<0.14 U	<0.14 U
Benzo(b)fluoranthene	<0.12 U	<0.11 U	<0.1 U
Indeno(1,2,3-cd)pyrene	<0.15 U	<0.14 U	<0.14 U
Naphthalene	<0.19 U	<0.18 U	<0.18 U

Location	SB36_E1
Sample Name	SB36_E1_8-10
Sample Date	05/24/2023
Sample Depth	8-10
VOCs	
1,2,4-Trimethylbenzene	0.46
1,3,5-Trimethylbenzene (Mesitylene)	0.17
Acetone	<0.012 U
Benzene	<0.00062 U
Ethylbenzene	0.0071
Naphthalene	0.25
n-Butylbenzene	0.046 J
n-Propylbenzene	0.026
Sec-Butylbenzene	0.01
Toluene	<0.0012 U
Total Xylenes	0.079

Location	SB36	SB36	SB36
Sample Name	SB36_0-2	SB36_11-13	SB36_14-16
Sample Date	05/18/2023	05/18/2023	05/18/2023
Sample Depth	0-2	11-13	14-16
VOCs			
1,2,4-Trimethylbenzene	<0.0022 U	0.0013 J	<0.0024 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.0022 U	0.0003 J	<0.0024 U
Acetone	0.012	0.013	<0.012 U
Benzene	<0.00056 U	<0.00054 U	<0.00059 U
Ethylbenzene	<0.0011 U	<0.0011 U	<0.0012 U
Naphthalene	0.00073 J	<0.0044 U	<0.0047 U
n-Butylbenzene	<0.0011 U	<0.0011 U	<0.0012 U
n-Propylbenzene	<0.0011 U	<0.0011 U	<0.0012 U
Tetrachloroethene (PCE)	<0.00056 U	<0.00054 U	<0.00059 U
Toluene	<0.0011 U	<0.0011 U	<0.0012 U
Total Xylenes	<0.0011 U	<0.0011 U	<0.0012 U
SVOCs			
Benzo(a)anthracene	0.35	<0.12 U	<0.12 U
Benzo(a)pyrene	0.33	<0.16 U	<0.16 U
Benzo(b)fluoranthene	0.37	<0.12 U	<0.12 U
Benzo(k)fluoranthene	0.12	<0.12 U	<0.12 U
Chrysene	0.38	<0.12 U	<0.12 U
Dibenz(a,h)anthracene	0.047 J	<0.12 U	<0.12 U
Fluoranthene	0.74	<0.12 U	<0.12 U
Indeno(1,2,3-cd)pyrene	0.21	<0.16 U	<0.16 U
Naphthalene	0.069 J	<0.2 U	<0.21 U
Pyrene	0.75	<0.12 U	<0.12 U
Pesticides			
4,4'-DDD	<0.00186 U	<0.00194 U	<0.00196 U
4,4'-DDE	0.0014 J	<0.00194 U	<0.00196 U
4,4'-DDT	<0.00186 U	<0.00194 U	<0.00196 U
Aldrin	<0.00186 U	<0.00194 U	<0.00196 U
Alpha Chlordane	0.00739 J	<0.00242 U	<0.00245 U
Dieldrin	0.00118	<0.00121 U	<0.00122 U
Metals			
Barium	93	1.75	1.8
Chromium, Hexavalent	0.338 J	<0.977 U	<0.992 U
Chromium, Trivalent	21.2 J	1.97	2.14
Copper	47.4	0.358 J	0.639 J
Lead	**110**	0.775 J	1 J
Mercury	0.154	<0.077 U	<0.078 U
Zinc	**110**	2.87 J	3.33 J
PFAS			
Perfluorooctanesulfonic Acid (PFOS)	0.000112 J	<0.0002 U	<0.000197 U

Location	SB36_NW1
Sample Name	SB36_NW1_8-10
Sample Date	05/24/2023
Sample Depth	8-10
VOCs	
1,2,4-Trimethylbenzene	**91**
1,3,5-Trimethylbenzene (Mesitylene)	**40**
Acetone	<3.6 U
Benzene	**0.24**
Ethylbenzene	0.7
Naphthalene	5.5
n-Butylbenzene	11
n-Propylbenzene	**7.8**
Sec-Butylbenzene	4
Toluene	**0.9**
Total Xylenes	**8.8**

Location	SB36_S1
Sample Name	SB36_S1_8-10
Sample Date	05/24/2023
Sample Depth	8-10
VOCs	
1,2,4-Trimethylbenzene	<0.0021 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.0021 U
Acetone	<0.011 U
Benzene	<0.00053 U
Ethylbenzene	<0.0011 U
Naphthalene	<0.0042 UJ
n-Butylbenzene	<0.0011 U
n-Propylbenzene	<0.0011 U
Sec-Butylbenzene	<0.0011 U
Toluene	<0.0011 U
Total Xylenes	<0.0011 U

Location	SB36_S2	SB36_S2
Sample Name	SB36_S2_8-10	SB36_S2_12-14
Sample Date	05/24/2023	05/24/2023
Sample Depth	8-10	12-14
VOCs		
1,2,4-Trimethylbenzene	<0.0024 U	<0.003 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.0024 U	<0.003 U
Acetone	<0.012 U	<0.015 U
Benzene	<0.00059 U	<0.00075 U
Ethylbenzene	<0.0012 U	<0.0015 U
Naphthalene	0.0031 J	<0.006 UJ
n-Butylbenzene	<0.0012 U	<0.0015 U
n-Propylbenzene	<0.0012 U	<0.0015 U
Sec-Butylbenzene	0.0003 J	<0.0015 U
Toluene	<0.0012 U	<0.0015 U
Total Xylenes	<0.0012 U	<0.0015 U
SVOCs		
Benzo(a)pyrene	<0.15 U	<0.16 U
Benzo(b)fluoranthene	<0.11 U	<0.12 U
Indeno(1,2,3-cd)pyrene	<0.15 U	<0.16 U
Naphthalene	0.2	0.038 J

Location	SB35_SW2
Sample Name	SB35_SW2_7-9
Sample Date	05/30/2023
Sample Depth	7-9
VOCs	
1,2,4-Trimethylbenzene	2.7 J
1,3,5-Trimethylbenzene (Mesitylene)	0.63 J
Acetone	**0.11 J**
Benzene	<0.00053 U
Ethylbenzene	0.18 J
Naphthalene	0.64
n-Butylbenzene	0.38 J
n-Propylbenzene	0.2 J
Sec-Butylbenzene	0.28 J
Toluene	0.001 J
Total Xylenes	**0.32 J**

Location	SB36_W1	SB36_W1
Sample Name	SB36_W1_8-10	SB36_W1_14-16
Sample Date	05/24/2023	05/24/2023
Sample Depth	8-10	14-16
VOCs		
1,2,4-Trimethylbenzene	0.029	<0.0024 U
1,3,5-Trimethylbenzene (Mesitylene)	0.0075	<0.0024 U
Acetone	<0.01 U	<0.012 U
Benzene	<0.0005 U	<0.00061 U
Ethylbenzene	0.0067	<0.0012 U
Naphthalene	0.0052	<0.0049 U
n-Butylbenzene	0.0091	<0.0012 U
n-Propylbenzene	0.018	<0.0012 U
Sec-Butylbenzene	0.0041	<0.0012 U
Toluene	0.0009 J	<0.0012 U
Total Xylenes	0.027	<0.0012 U

Legend

- Approximate Site Boundary
- Tax Parcel
- RI Soil Boring Location
- RI Soil Boring, Monitoring Well, and Co-Located Soil Vapor Point Location
- Petroleum Impact Delineation Boring Location
- Petroleum Impact Delineation Boring/ Monitoring Well Location

Analyte	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs
VOCs			
1,2,4-Trimethylbenzene	3.6	3.6	52
1,3,5-Trimethylbenzene (Mesitylene)	8.4	8.4	52
Acetone	0.05	0.05	100
Benzene	0.06	0.06	4.8
Ethylbenzene	1	1	41
Naphthalene	12	12	100
n-Butylbenzene	12	12	100
n-Propylbenzene	3.9	3.9	100
Sec-Butylbenzene	11	11	100
Tetrachloroethene (PCE)	1.3	1.3	19
Toluene	0.7	0.7	100
Total Xylenes	0.26	1.6	100
SVOCs			
Benzo(a)anthracene	1	1	1
Benzo(a)pyrene	1	22	1
Benzo(b)fluoranthene	1	1.7	1
Benzo(k)fluoranthene	0.8	1.7	3.9
Chrysene	1	1	3.9
Dibenz(a,h)anthracene	0.33	1000	0.33
Fluoranthene	100	1000	100
Indeno(1,2,3-cd)pyrene	0.5	8.2	0.5
Naphthalene	12	12	100
Pyrene	100	1000	100
Pesticides			
4,4'-DDD	0.0033	14	13
4,4'-DDE	0.0033	17	8.9
4,4'-DDT	0.0033	136	79
Aldrin	0.005	0.19	0.097
Alpha Chlordane	0.094	2.9	4.2
Dieldrin	0.005	0.1	0.2
Metals			
Barium	350	820	400
Chromium, Hexavalent	1	19	110
Chromium, Trivalent	30	NS	180
Copper	50	1720	270
Lead	63	450	400
Mercury	0.18	0.73	0.81
Zinc	109	2480	10000
PFAS			
Perfluorooctanesulfonic Acid (PFOS)	0.00088	0.001	0.044

Exceedance Summary:

10 - Result exceeds Unrestricted Use SCOs
10 - Result exceeds Protection of Groundwater SCOs
10 - Result exceeds Restricted Use Restricted-Residential SCOs

Notes:
1. Aerial imagery provided through Langan's subscription to NearMap.com, flown 5/28/2023.
2. Parcel data provided by the New York City Department of City Planning.
3. All features shown are approximate.
4. Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 of the Official Compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use, Protection of Groundwater, and Restricted Use Restricted-Residential Soil Cleanup Objectives (SCO).
5. Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Part 375 Remedial Programs Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS) Unrestricted Use, Restricted Use Restricted-Residential, and Protection of Groundwater Guidance Values (April 2023).
6. Criterion comparisons for 3- & 4-methylphenol (m&p cresol) are provided for reference. Promulgated SCOs are for 3-methylphenol (m-cresol) and 4-methylphenol (p-cresol).
9. RI - Remedial Investigation
10. RL - Reporting Limit
11. All units are in mg/kg (milligrams per kilogram)
12. NS - No Standard

Qualifiers:
J - The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
UJ - The analyte was not detected at a level greater than or equal to the RL; however, the reported RL is approximate and may be inaccurate or imprecise.
U - The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the RL or the sample concentration for results impacted by blank contamination.

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Project
1709 SURF AVE
BLOCK No. 7061,
LOT Nos. 14, 16, 20, 21, & 27
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
RI SOIL SAMPLE ANALYTICAL RESULTS - PETROLEUM IMPACTS DELINEATION

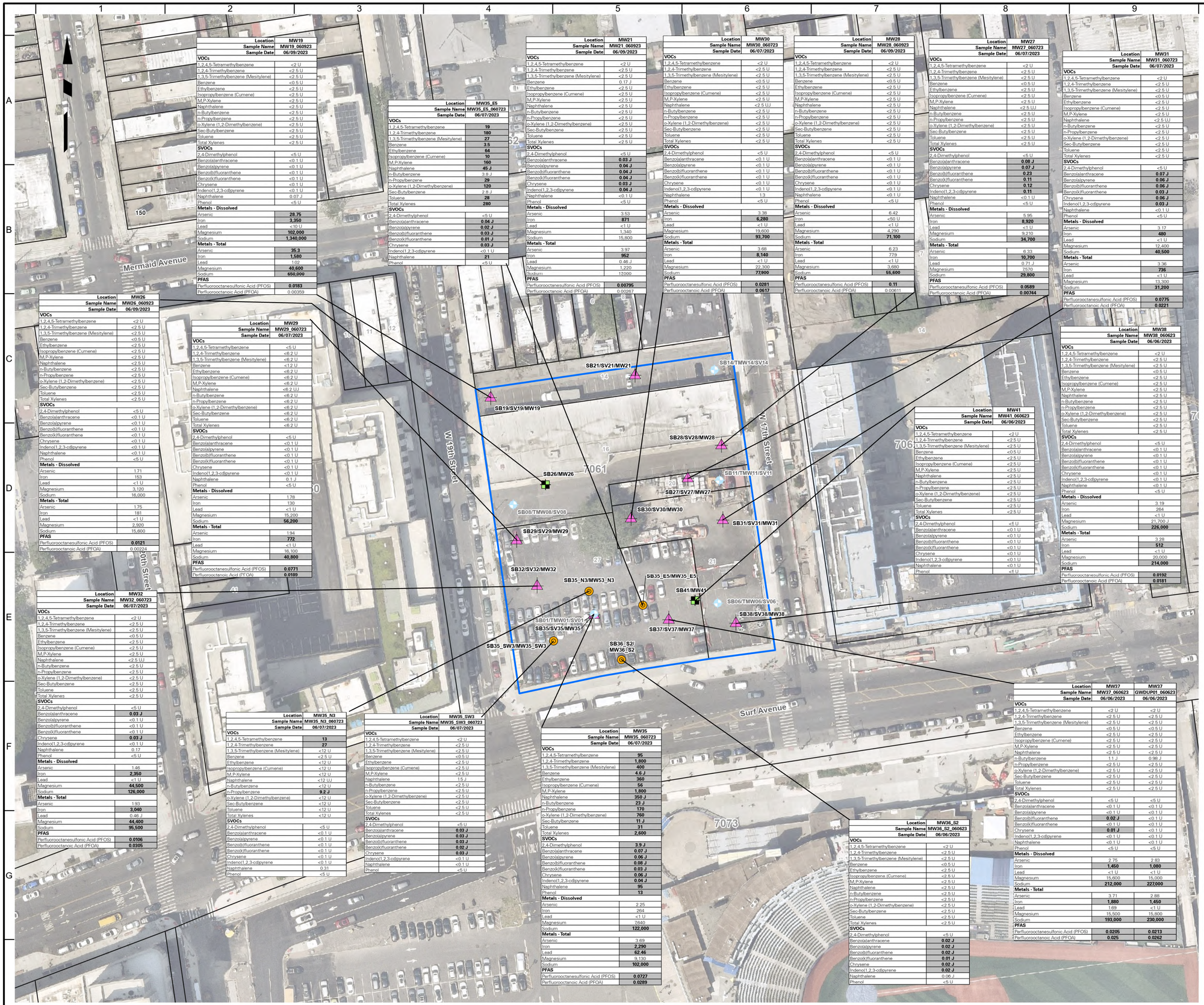
Project No.	170747001
Date	7/8/2024
Scale	1"=20'
Drawn By	GS

Figure No. **4B**

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LANGAN
PROJECT No. 170747001


Mermaid Avenue
Surf Avenue
W 16th Street
W 17th Street
10th Street
SB21/SV21/MW21
SB14/TMW14/SV14
SB19/SV19/MW19
SB28/SV28/MW28
SB26/MW26
SB11/TMW11/SV11
SB27/SV27/MW27
SB08/TMW08/SV08
SB30/SV30/MW30
SB31/SV31/MW31
SB29/SV29/MW29
SB32/SV32/MW32
SB35_N3/MW53_N3
SB35_E5/MW35_E5
SB41/MW41
SB06/TMW06/SV06
SB01/TMW01/SV01
SB35/SV35/MW35
SB37/SV37/MW37
SB38/SV38/MW38
SB35_SW3/MW35_SW3
SB36_S2/MW36_S2
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Sample Location	Latitude	Longitude	Sample Elevation (ft)	Sample Depth (ft)
EP01	40.576082	-73.98559	4.5	2
EP02	40.576093	-73.985484	3.5	3
EP03	40.576105	-73.985377	4.5	2
EP04	40.576117	-73.98527	4.5	2
EP05	40.576129	-73.985163	4.5	2
EP06	40.576141	-73.985056	4.5	2
EP07	40.576152	-73.984949	3.0	4
EP08	40.576164	-73.984842	3.0	4
EP09	40.57601	-73.985577	1.5	5
EP10	40.576022	-73.98547	1.5	5
EP11	40.576033	-73.985363	1.5	5
EP12	40.576045	-73.985256	1.5	5
EP13	40.576057	-73.985149	0.5	5
EP14	40.576069	-73.985042	1.0	6
EP15	40.57608	-73.984936	1.0	6
EP16	40.576092	-73.984829	1.0	6
EP17	40.575932	-73.985563	1.5	5
EP18	40.575944	-73.985456	1.5	5
EP19	40.575956	-73.985349	1.5	5
EP20	40.575968	-73.985242	1.5	5
EP21	40.575979	-73.985136	1.5	5
EP22	40.575991	-73.985029	0.0	7
EP23	40.576003	-73.984922	1.0	6
EP24	40.576015	-73.984815	1.0	6
EP25	40.575851	-73.985548	1.5	7
EP26	40.575863	-73.985441	1.5	7
EP27	40.575874	-73.985334	3.0	6
EP28	40.575886	-73.985227	2.0	6
EP29	40.575898	-73.98512	2.0	6
EP30	40.57581	-73.985013	0.0	7
EP31	40.575922	-73.984906	0.0	7
EP32	40.575933	-73.9848	1.0	6
EP33	40.575789	-73.985532	2.0	3
EP34	40.575781	-73.985425	2.0	6
EP35	40.575703	-73.985318	2.0	6
EP36	40.575805	-73.985212	6.0	3
EP37	40.575817	-73.985105	5.0	4
EP38	40.575828	-73.984998	1.0	8
EP39	40.57584	-73.984891	0.0	9
EP40	40.575852	-73.984784	0.0	6
EP41	40.575688	-73.985517	4.0	5
EP42	40.5757	-73.98541	2.0	7
EP43	40.575711	-73.985303	3.0	6
EP44	40.575723	-73.985196	3.0	2
EP45	40.575735	-73.985089	6.0	2
EP46	40.575747	-73.984982	6.5	5
EP47	40.575759	-73.984875	4.0	5
EP48	40.57577	-73.984769	4.0	5
EP49	40.575606	-73.985501	4.0	6
EP50	40.575618	-73.985394	3.0	16
EP51	40.57563	-73.985288	-6.0	16
EP52	40.575642	-73.985181	-6.0	16
EP53	40.575654	-73.985074	-6.0	16
EP54	40.575665	-73.984967	3.0	6
EP55	40.575677	-73.98486	2.0	6
EP56	40.575689	-73.984753	3.0	6
EP57	40.575525	-73.985486	3.0	6
EP58	40.575537	-73.985379	-6.0	16
EP59	40.575548	-73.985272	-6.0	16
EP60	40.57556	-73.985165	-6.0	16
EP61	40.575572	-73.985058	-6.0	16
EP62	40.575584	-73.984951	4.0	5
EP63	40.575596	-73.984845	4.0	5
EP64	40.575607	-73.984738	2.0	6
EP65	40.575443	-73.98547	2.0	6
EP66	40.575455	-73.985364	-6.0	16
EP67	40.575467	-73.985257	-6.0	16
EP68	40.575479	-73.98515	-6.0	16
EP69	40.575491	-73.985043	-6.0	16
EP70	40.575502	-73.984936	4.0	5
EP71	40.575514	-73.984829	4.0	5
EP72	40.575526	-73.984722	2.0	6
EP73	40.575378	-73.98539	4.0	5
EP74	40.575404	-73.985204	3.0	6
EP75	40.575436	-73.984945	4.0	5
EP76	40.575458	-73.984753	3.0	6
EPSW01	40.576049	-73.985548	0.5	6
EPSW02	40.576062	-73.985427	0.5	6
EPSW03	40.576076	-73.985306	1.5	5
EPSW04	40.576086	-73.985212	1.5	5
EPSW05	40.5761	-73.985103	1.5	5
EPSW06	40.576111	-73.984988	1.0	6
EPSW07	40.576123	-73.98489	1.0	6
EPSW08	40.576132	-73.984794	1.0	6
EPSW09	40.576034	-73.985063	1.0	6
EPSW10	40.575956	-73.98505	1.0	6
EPSW16	40.575651	-73.985514	3.0	6
EPSW18	40.575808	-73.985251	2.0	5
EPSW19	40.575857	-73.985198	3.0	5
EPSW20	40.575867	-73.98509	3.0	5
EPSW21	40.575886	-73.985033	1.0	6
EPSW22	40.575812	-73.98502	1.0	8
EPSW23	40.57574	-73.985005	3.0	5
EPSW24	40.575703	-73.985051	3.0	6
EPSW25	40.575692	-73.985168	3.0	6
EPSW26	40.575717	-73.985235	3.0	6
EPSW27	40.575801	-73.984948	1.0	6
EPSW28	40.575809	-73.984838	1.0	6
EPSW29	40.575819	-73.98474	1.0	6
EPSW31	40.57549805	-73.98549345	2.0	5

Sample Location	Latitude	Longitude	Sample Elevation (ft)	Sample Depth (ft)
UST2_B1	40.575530	-73.984885	3.5	5.5
UST2_B2	40.575511	-73.984880		
UST2_N	40.575537	-73.984877		
UST2_E1	40.575517	-73.984873		
UST2_E2	40.575550	-73.984890		
UST2_S	40.575499	-73.984877		
UST2_W1	40.575534	-73.984895		
UST2_W2	40.575515	-73.984890		

Legend

- Approximate Brownfield Cleanup Boundary
- Excavation to about 16 feet bgs to Remove Petroleum Impacts
- Decommissioned USTs
- TPC Exclusion Area - Area 1
- Former TPC Exclusion Area - Area 2
- Endpoint Sample Location
- Sidewall Sample Location
- UST Endpoint Sample Location
- Sample Excavated to 2 feet bgs
- Sample Excavated to 3 feet bgs
- Sample Excavated to 4 feet bgs
- Sample Excavated to 5 feet bgs
- Sample Excavated to 5.5 feet bgs
- Sample Excavated to 6 feet bgs
- Sample Excavated to 7 feet bgs
- Sample Excavated to 8 feet bgs
- Sample Excavated to 9 feet bgs
- Sample Excavated to 16 feet bgs

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Notes:
1. Aerial imagery provided through Langan's subscription to NearMap.com, flown 5/28/2023.
2. Parcel data provided by the New York City Department of City Planning.
3. Endpoint sample locations are placed at a frequency of approximately one per 900 square feet.
4. Sidewall sample locations are placed at a frequency of approximately one per 30 linear feet.
5. Sidewall samples were not collected around the site perimeter or around the area where petroleum impacts were observed due to support of excavation (e.g., sheet pile walls).
6. All features shown are approximate.
7. bgs - Below Grade Surface
8. All confirmation endpoint samples achieved the New York State Department of Environmental Conservation (NYSDEC) Title 6 New York Codes, Rules and Regulations (NYCRR) Part 375 Unrestricted Use (UU) Soil Cleanup Objectives (SCO) and Commissioner's Policy (CP)-51 Soil Cleanup Levels.
9. Confirmation endpoint samples were not collected from the UST 1 tank grave as the remedial excavation in the vicinity of the tank extended deeper to 16 feet bgs.
10. UST - Underground Storage Tank
11. TPC - Tangible Property Credit
12. Area 1 is an about 280-square-foot area and generated about 62 cubic yards (93 tons) of soil/fill from surface grade to 6 feet bgs.
13. Area 2 is an about 4,240-square-foot area and generated about 2,513 cubic yards (3,770 tons) of soil/fill from surface grade to 16 feet bgs.

WARNING: It is a violation of the NYS Education Law Article 145 for any person, unless acting under the direction of a licensed professional engineer, land surveyor or geologist, to alter this item in any way.

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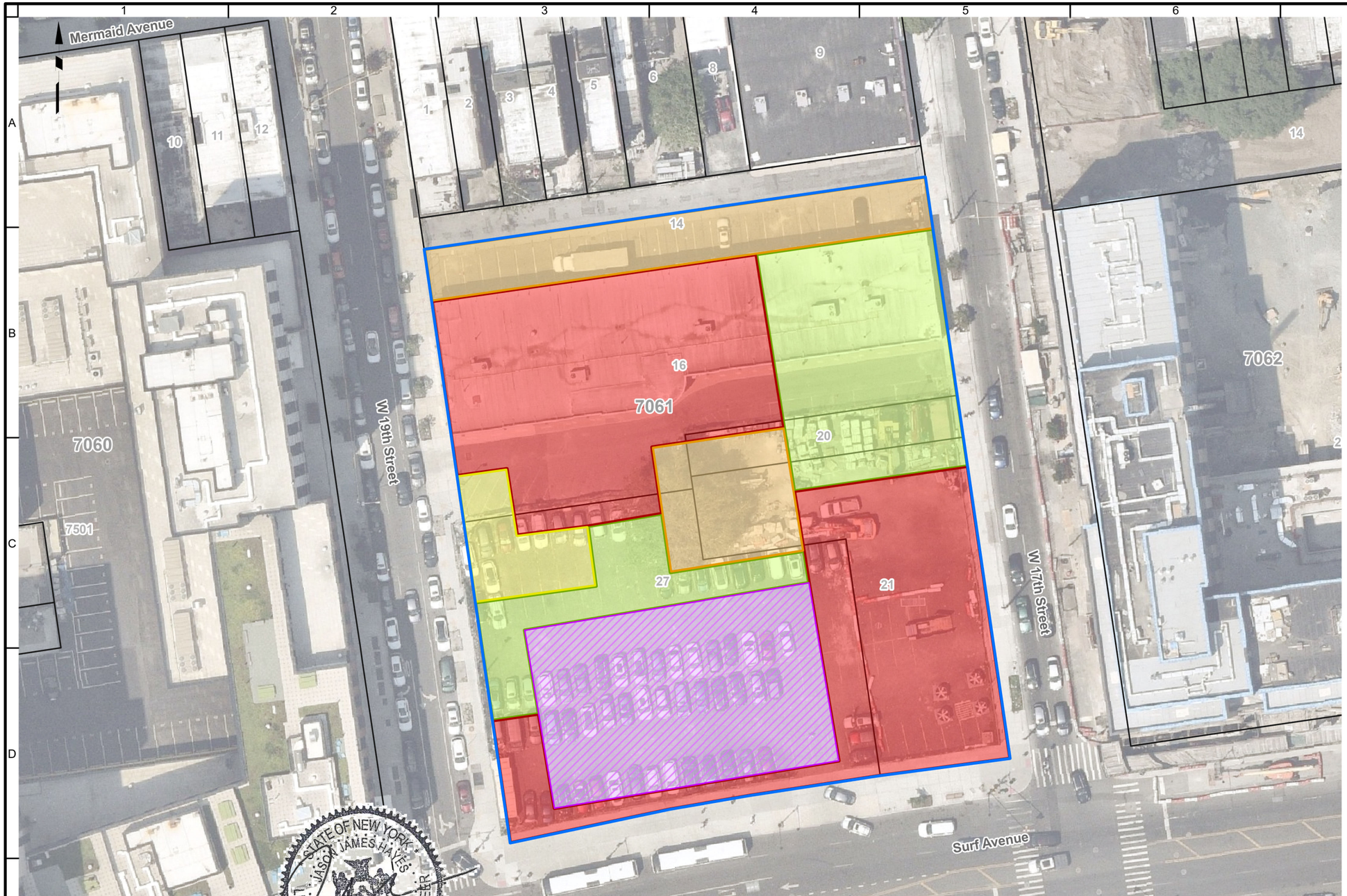
Project
1709 SURF AVE
BLOCK No. 7061,
LOT Nos. 14, 16, 20, 21, & 27
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
CONFIRMATION ENDPOINT SAMPLE LOCATION MAP

Project No. 170747001
Date 12/17/2025
Scale 1"=40'
Drawn By GS
Figure No. 5

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Path: \\langan.com\data\NYC\data0\170747001\Project Data\ArcGIS\APRX\170747001\170747001.aprx Date: 12/17/2025 User: Gsajbel Time: 10:07 AM



Legend

- Approximate Brownfield Cleanup Boundary
- Tax Parcel
- Excavation ranging between 2 and 4 feet bgs
- Excavation ranging between 3 and 7 feet bgs
- Excavation ranging between 5 and 7 feet bgs
- Excavation ranging between 6 and 9 feet bgs
- Excavation to about 16 feet bgs to Remove Petroleum Impacts

Notes:
1. Aerial imagery provided through Langan's subscription to NearMap.com, flown 5/28/2023.
2. Parcel data provided by the New York City Department of City Planning.
3. bgs - Below Grade Surface
4. All features shown are approximate.

STATE OF NEW YORK · JASON JAMES HAYES · 089491 · LICENSED PROFESSIONAL ENGINEER
9/16/2025

WARNING: It is a violation of the NYS Education Law Article 145 for any person, unless acting under the direction of a licensed professional engineer, land surveyor or geologist, to alter this item in any way.

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Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
368 Ninth Avenue, 8th Floor
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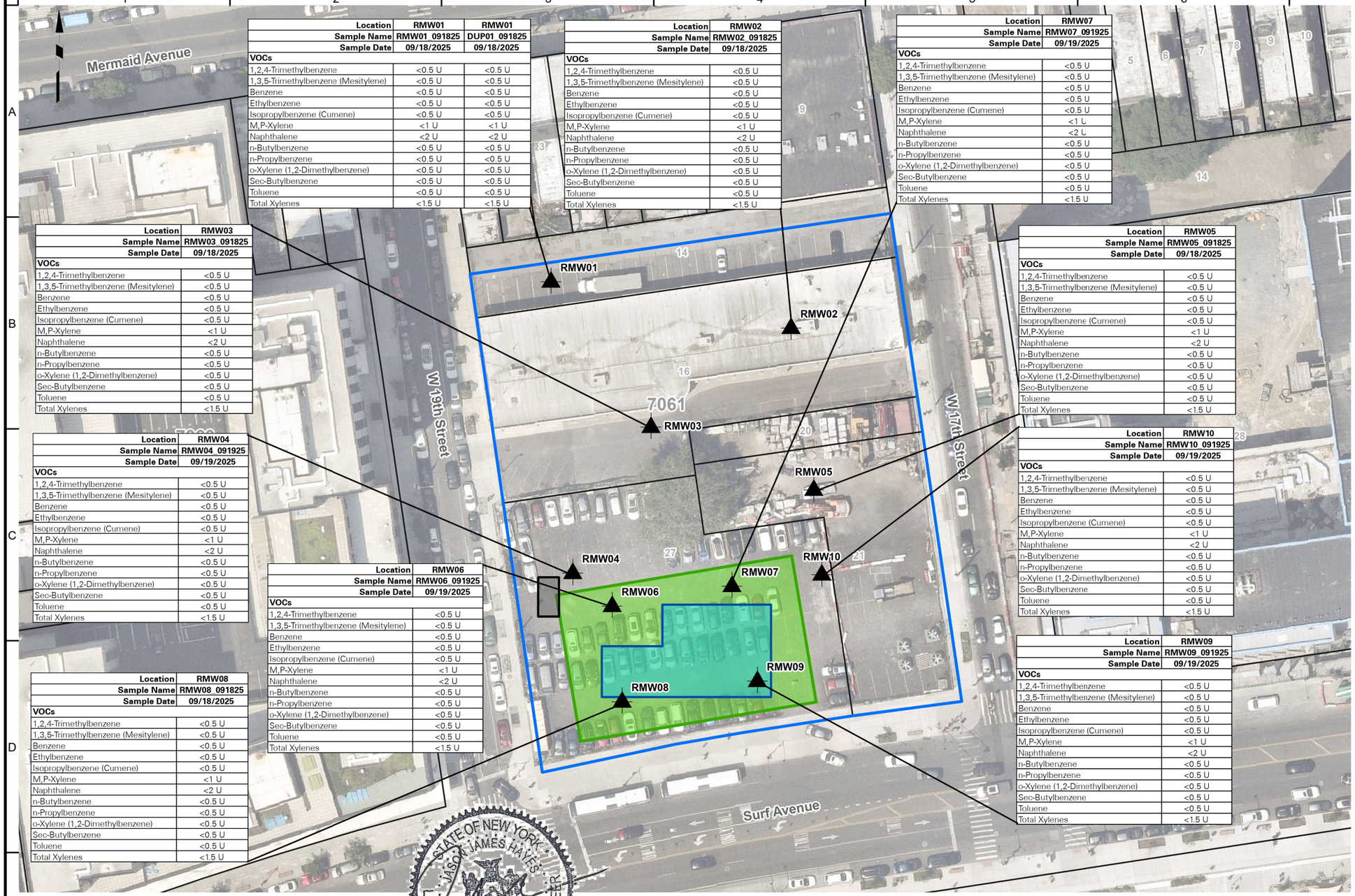
Project
1709 SURF AVE
BLOCK No. 7061,
LOT Nos. 14, 16, 20, 21, & 27
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
EXCAVATION LOCATION MAP

Project No.	Figure No.
170747001	6
Date: 9/30/2025	
Scale: 1"=50'	
Drawn By: GS	

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Location	RMW01	RMW01
Sample Name	RMW01_091825	DUP01_091825
Sample Date	09/18/2025	09/18/2025
VOCs		
1,2,4-Trimethylbenzene	<0.5 U	<0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.5 U	<0.5 U
Benzene	<0.5 U	<0.5 U
Ethylbenzene	<0.5 U	<0.5 U
Isopropylbenzene (Cumene)	<0.5 U	<0.5 U
M,P-Xylene	<1 U	<1 U
Naphthalene	<2 U	<2 U
n-Butylbenzene	<0.5 U	<0.5 U
n-Propylbenzene	<0.5 U	<0.5 U
o-Xylene (1,2-Dimethylbenzene)	<0.5 U	<0.5 U
Sec-Butylbenzene	<0.5 U	<0.5 U
Toluene	<0.5 U	<0.5 U
Total Xylenes	<1.5 U	<1.5 U

Location	RMW02
Sample Name	RMW02_091825
Sample Date	09/18/2025
VOCs	
1,2,4-Trimethylbenzene	<0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.5 U
Benzene	<0.5 U
Ethylbenzene	<0.5 U
Isopropylbenzene (Cumene)	<0.5 U
M,P-Xylene	<1 U
Naphthalene	<2 U
n-Butylbenzene	<0.5 U
n-Propylbenzene	<0.5 U
o-Xylene (1,2-Dimethylbenzene)	<0.5 U
Sec-Butylbenzene	<0.5 U
Toluene	<0.5 U
Total Xylenes	<1.5 U

Location	RMW07
Sample Name	RMW07_091925
Sample Date	09/19/2025
VOCs	
1,2,4-Trimethylbenzene	<0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.5 U
Benzene	<0.5 U
Ethylbenzene	<0.5 U
Isopropylbenzene (Cumene)	<0.5 U
M,P-Xylene	<1 U
Naphthalene	<2 U
n-Butylbenzene	<0.5 U
n-Propylbenzene	<0.5 U
o-Xylene (1,2-Dimethylbenzene)	<0.5 U
Sec-Butylbenzene	<0.5 U
Toluene	<0.5 U
Total Xylenes	<1.5 U

Location	RMW03
Sample Name	RMW03_091825
Sample Date	09/18/2025
VOCs	
1,2,4-Trimethylbenzene	<0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.5 U
Benzene	<0.5 U
Ethylbenzene	<0.5 U
Isopropylbenzene (Cumene)	<0.5 U
M,P-Xylene	<1 U
Naphthalene	<2 U
n-Butylbenzene	<0.5 U
n-Propylbenzene	<0.5 U
o-Xylene (1,2-Dimethylbenzene)	<0.5 U
Sec-Butylbenzene	<0.5 U
Toluene	<0.5 U
Total Xylenes	<1.5 U

Location	RMW05
Sample Name	RMW05_091825
Sample Date	09/18/2025
VOCs	
1,2,4-Trimethylbenzene	<0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.5 U
Benzene	<0.5 U
Ethylbenzene	<0.5 U
Isopropylbenzene (Cumene)	<0.5 U
M,P-Xylene	<1 U
Naphthalene	<2 U
n-Butylbenzene	<0.5 U
n-Propylbenzene	<0.5 U
o-Xylene (1,2-Dimethylbenzene)	<0.5 U
Sec-Butylbenzene	<0.5 U
Toluene	<0.5 U
Total Xylenes	<1.5 U

Location	RMW04
Sample Name	RMW04_091925
Sample Date	09/19/2025
VOCs	
1,2,4-Trimethylbenzene	<0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.5 U
Benzene	<0.5 U
Ethylbenzene	<0.5 U
Isopropylbenzene (Cumene)	<0.5 U
M,P-Xylene	<1 U
Naphthalene	<2 U
n-Butylbenzene	<0.5 U
n-Propylbenzene	<0.5 U
o-Xylene (1,2-Dimethylbenzene)	<0.5 U
Sec-Butylbenzene	<0.5 U
Toluene	<0.5 U
Total Xylenes	<1.5 U

Location	RMW10
Sample Name	RMW10_091925
Sample Date	09/19/2025
VOCs	
1,2,4-Trimethylbenzene	<0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.5 U
Benzene	<0.5 U
Ethylbenzene	<0.5 U
Isopropylbenzene (Cumene)	<0.5 U
M,P-Xylene	<1 U
Naphthalene	<2 U
n-Butylbenzene	<0.5 U
n-Propylbenzene	<0.5 U
o-Xylene (1,2-Dimethylbenzene)	<0.5 U
Sec-Butylbenzene	<0.5 U
Toluene	<0.5 U
Total Xylenes	<1.5 U

Location	RMW06
Sample Name	RMW06_091925
Sample Date	09/19/2025
VOCs	
1,2,4-Trimethylbenzene	<0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.5 U
Benzene	<0.5 U
Ethylbenzene	<0.5 U
Isopropylbenzene (Cumene)	<0.5 U
M,P-Xylene	<1 U
Naphthalene	<2 U
n-Butylbenzene	<0.5 U
n-Propylbenzene	<0.5 U
o-Xylene (1,2-Dimethylbenzene)	<0.5 U
Sec-Butylbenzene	<0.5 U
Toluene	<0.5 U
Total Xylenes	<1.5 U

Location	RMW09
Sample Name	RMW09_091925
Sample Date	09/19/2025
VOCs	
1,2,4-Trimethylbenzene	<0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.5 U
Benzene	<0.5 U
Ethylbenzene	<0.5 U
Isopropylbenzene (Cumene)	<0.5 U
M,P-Xylene	<1 U
Naphthalene	<2 U
n-Butylbenzene	<0.5 U
n-Propylbenzene	<0.5 U
o-Xylene (1,2-Dimethylbenzene)	<0.5 U
Sec-Butylbenzene	<0.5 U
Toluene	<0.5 U
Total Xylenes	<1.5 U

Location	RMW08
Sample Name	RMW08_091825
Sample Date	09/18/2025
VOCs	
1,2,4-Trimethylbenzene	<0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.5 U
Benzene	<0.5 U
Ethylbenzene	<0.5 U
Isopropylbenzene (Cumene)	<0.5 U
M,P-Xylene	<1 U
Naphthalene	<2 U
n-Butylbenzene	<0.5 U
n-Propylbenzene	<0.5 U
o-Xylene (1,2-Dimethylbenzene)	<0.5 U
Sec-Butylbenzene	<0.5 U
Toluene	<0.5 U
Total Xylenes	<1.5 U

Legend

- Approximate Brownfield Cleanup Boundary
- Tax Parcel
- Approximate Area of PetroFix™ and EA Blend Application (Target depth ~5 to 16 feet bgs.)
- TPC Exclusion Area - Area 1
- Former TPC Exclusion Area - Area 2
- Post-Remedial Groundwater Monitoring Well Location

Analyte	NYSDEC SGVs
VOCs	
1,2,4-Trimethylbenzene	5
1,3,5-Trimethylbenzene (Mesitylene)	5
Benzene	1
Ethylbenzene	5
Isopropylbenzene (Cumene)	5
M,P-Xylene	5
Naphthalene	10
n-Butylbenzene	5
n-Propylbenzene	5
o-Xylene (1,2-Dimethylbenzene)	5
Sec-Butylbenzene	5
Toluene	5
Total Xylenes	5

Exceedance Summary:

10 - Result exceeds NYSDEC SGVs

Notes:

1. Aerial imagery provided through Langan's subscription to NearMap.com, flown 5/28/2023.
2. Parcel data provided by the New York City Department of City Planning.
3. Groundwater samples were analyzed for Commissioner's Policy (CP)-51 list VOCs. Only VOCs that were detected above the SGVs during the remedial investigation are shown on this figure
4. All features shown are approximate.
5. Groundwater sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 of the Official Compilation of New York Codes, Rules, and Regulations (NYCRR) Part 703.5 and the NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values for Class GA Water (herein collectively referenced as "NYSDEC SGVs").
6. All post-remediation groundwater sample results were detected below the NYSDEC SGVs.
7. Results are presented in micrograms per liter (µg/L).
8. VOC - Volatile Organic Compound
9. RL - Reporting Limit
10. <RL - Not Detected
11. TPC - Tangible Property Credit
12. Area 1 is an about 280-square-foot area and generated about 62 cubic yards (93 tons) of soil/fill from surface grade to 6 feet bgs.
13. Area 2 is an about 4,240-square-foot area and generated about 2,513 cubic yards (3,770 tons) of soil/fill from surface grade to 16 feet bgs.
14. Groundwater treatment included application of 2,500 pounds of PetroFix™ remediation fluid and 1,240 pounds of Electron Acceptor (EA) Blend, via soil mixing with 6,100 gallons of potable water to the dry excavation area in depth intervals starting at 16, 10, 9, 8, and 6 feet bgs (for treatment from 6 to 16 feet bgs).

Qualifiers:

J - The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
U - The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the RL or the sample concentration for results impacted by blank contamination.

STATE OF NEW YORK
JASON JAMES HAYES
089491
LICENSED PROFESSIONAL ENGINEER
12/16/2025

WARNING: It is a violation of the NYS Education Law Article 145 for any person, unless acting under the direction of a licensed professional engineer, land surveyor or geologist, to alter this item in any way.

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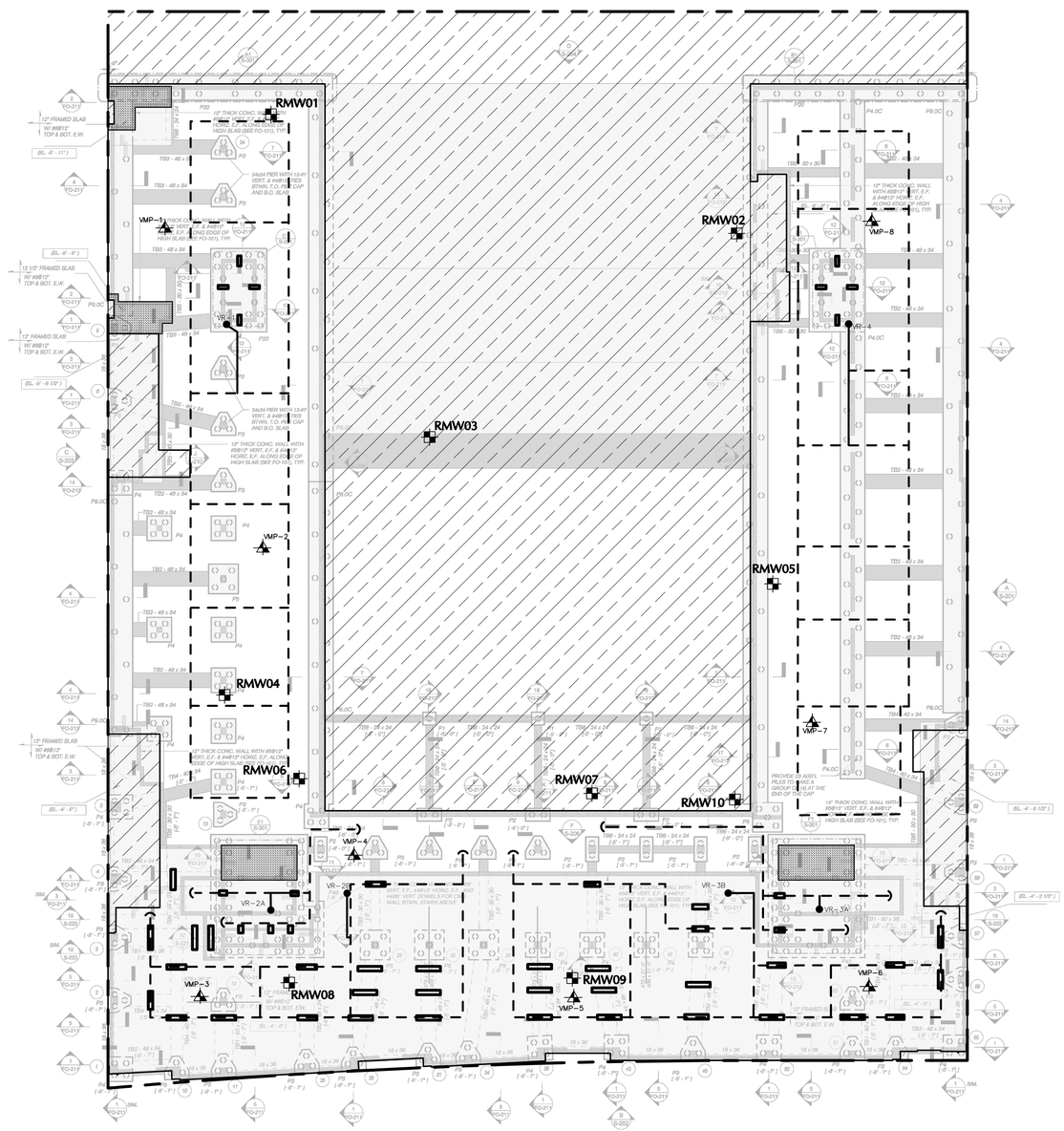
Project
1709 SURF AVE
BLOCK No. 7061,
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BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
POST-REMEDIAL GROUNDWATER SAMPLE ANALYTICAL RESULTS MAP

Project No. 170747001
Date 12/17/2025
Scale 1"=60'
Drawn By GS
Figure No. 7

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RMW01
RMW02
RMW03
RMW04
RMW05
RMW06
RMW07
RMW08
RMW09
RMW10
VMP-1
VMP-2
VMP-3
VMP-4
VMP-5
VMP-6
VMP-7
VMP-8
VR-1
VR-2A
VR-2B
VR-3A
VR-4
12" THICK CONC. WALL WITH #5@12" VERT. E.F. & #4@12" HORIZ. E.F. ALONG EDGE OF HIGH SLAB (SEE FO-101), TYP.
12" FRAMED SLAB W/ #6@12" TOP & BOT. E.W.
2-#4@4 PIER WITH 12-#7 VERT. & #4@12" TIES BTWN. T.O. PIER CAP AND B.O. SLAB
P1
P2
P3
P4
P5
P6
P8
P9
P10
P20
P30
P40
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P340
P350
P360
P370
P380
P390
P400

APPENDIX A

ENVIRONMENTAL EASEMENT AND SURVEY

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

This page is part of the instrument. The City Register will rely on the information provided by you on this page for purposes of indexing this instrument.The information on this page will control for indexing purposes in the event of any conflict with the rest of the document.

2025100800145001001E2889

RECORDING AND ENDORSEMENT COVER PAGE **PAGE 1 OF 15**

Document ID: 2025100800145001 Document Date: 09-29-2025 Preparation Date: 10-08-2025
Document Type: EASEMENT
Document Page Count: 13

PRESENTER:
SIVE PAGET & RIESEL, P.C.
560 LEXINGTON AVENUE, 15TH FLOOR
NEW YORK, NY 10022
212-421-2150
NDUNCAN@SPRLAW.COM

RETURN TO:
SIVE PAGET & RIESEL, P.C.
560 LEXINGTON AVENUE, 15TH FLOOR
NEW YORK, NY 10022
212-421-2150
NDUNCAN@SPRLAW.COM

PROPERTY DATA

Borough	Block	Lot		Unit	Address
BROOKLYN	7061	14	Partial Lot		2914 WEST 17 STREET

Property Type: COMMERCIAL REAL ESTATE Easement

Borough	Block	Lot		Unit	Address
BROOKLYN	7061	16	Entire Lot		2925 WEST 19 STREET

Property Type: COMMERCIAL REAL ESTATE Easement

☒ Additional Properties on Continuation Page

CROSS REFERENCE DATA

CRFN_____ *or* DocumentID_____ *or* _____ Year_____ Reel____ Page_____ *or* File Number_____

PARTIES

GRANTOR/SELLER:
CONEY ISLAND PHASE III HOUSING DEVELOPMENT FUND CO
247 WEST 37TH STREET, 4TH FLOOR
NEW YORK, NY 10018

☒ Additional Parties Listed on Continuation Page

GRANTEE/BUYER:
PEOPLE OF NEW YORK BY DEPT. ENVIRONMENTAL CONSERVA
625 BROADWAY
ALBANY, NY 12233

FEES AND TAXES

Mortgage :		
Mortgage Amount:	$	0.00
Taxable Mortgage Amount:	$	0.00
Exemption:		
TAXES: County (Basic):	$	0.00
City (Additional):	$	0.00
Spec (Additional):	$	0.00
TASF:	$	0.00
MTA:	$	0.00
NYCTA:	$	0.00
Additional MRT:	$	0.00
TOTAL:	$	0.00
Recording Fee:	$	114.00
Affidavit Fee:	$	0.00

Filing Fee:	$	100.00
NYC Real Property Transfer Tax:	$	0.00
NYS Real Estate Transfer Tax:	$	0.00

RECORDED OR FILED IN THE OFFICE OF THE CITY REGISTER OF THE CITY OF NEW YORK
Recorded/Filed 10-08-2025 12:05
City Register File No.(CRFN): **2025000274830**

City Register Official Signature

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

2025100800145001001C2A09

RECORDING AND ENDORSEMENT COVER PAGE (CONTINUATION)

Document ID: 2025100800145001 Document Date: 09-29-2025 Preparation Date: 10-08-2025
Document Type: EASEMENT

PROPERTY DATA

Borough	Block	Lot		Unit	Address
BROOKLYN	7061	20	Entire Lot	4	2928 WEST 17 STREET
Property Type: COMMERCIAL REAL ESTATE Easement					
Borough	**Block**	**Lot**		**Unit**	**Address**
BROOKLYN	7061	21	Entire Lot		2930 WEST 17 STREET
Property Type: COMMERCIAL REAL ESTATE Easement					
Borough	**Block**	**Lot**		**Unit**	**Address**
BROOKLYN	7061	27	Entire Lot		1709 SURF AVENUE
Property Type: COMMERCIAL REAL ESTATE Easement					

PARTIES

GRANTOR/SELLER:
CONEY ISLAND ASSOCIATES PHASE 3 LLC
150 MYRTLE AVENUE, SUITE 2
BROOKLYN, NY 11201

GRANTOR/SELLER:
CONEY ISLAND ASSOCIATES 3 MODERATE LLC
150 MYRTLE AVENUE, SUITE 2
BROOKLYN, NY 11201

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 29th day of September, 20__, between Owner(s), Coney Island Phase III Housing Development Fund Corporation, having an office at 247 West 37th Street, 4th Fl, New York, NY (Grantor Fee Owner), Coney Island Associates Phase 3 LLC, having an office at 150 Myrtle Avenue, Suite 2, Brooklyn, NY (Grantor Leaseholder), and Coney Island Associates 3 Moderate LLC with an address of 150 Myrtle Avenue, Suite 2, Brooklyn, NY (Grantor Beneficial Owner; and together with Grantor Fee Owner, and Grantor Leaseholder collectively, the "Grantor"), and The People of the State of New York (the "Grantee"), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor Fee Owner, is the owner of real property located in the City of New York, County of Brooklyn and State of New York, known and designated on the tax map of the County Clerk of Brooklyn as:

Address	Block and Lot	CRFN
2914 West 17 St.	Block 7061 Lot 14	2025000064234
2925 West 19 St.	Block 7061 Lot 16	2025000183234
2928 West 17 St.	Block 7061 Lot 20	2025000064234
2930 West 17 St.	Block 7061 Lot 21	2025000183234
1709 Surf Ave.	Block 7061 Lot 27	2025000064234

The property subject to this Environmental Easement (the "Controlled Property")

comprises approximately 1.511 +/- acres and is hereinafter more fully described in the Land Title Survey dated May 20, 2025, prepared by Saeid Jalilvand, License No. 050236, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A;

WHEREAS, Grantor Beneficial Owner, are the owner of the beneficial interest in the Controlled Property being the same as that beneficial interest conveyed to Grantor Beneficial Owners by means of an Amended and Restated Declaration of Interest and Nominee Agreement between Grantor Fee Owner and Grantor Beneficial Owner dated as of June 26, 2025 and recorded in City Register of the City of New York on May 26, 2021 as CRFN # 2025000183235;

WHEREAS, Grantor Leaseholder, is the holder of a lease interest in the Controlled Property, as memorialized in a Memorandum of Master Lease dated as of June 26, 2025 and recorded in the City Register of the City of New York on March 26, 2025 as CRFN # 2025000183238; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement IndexNumber: C224398-05-24, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC

625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized

system identification number.

Parties shall address correspondence to:

Site Number: C224398
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

11. Consistency with the SMP. To the extent there is any conflict or inconsistency between the terms of this Environmental Easement and the SMP, regarding matters specifically addressed by the SMP, the terms of the SMP will control.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor Fee Owner has caused this instrument to be signed in its name.

Coney Island Phase III Housing Development Fund Corporation:

By: _____

Print Name: Jacqueline Tom

Title: Authorized Signatory Date: 09-11-2025

Grantor Fee Owner's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF NEW YORK)

On the 11th day of September, in the year 20 25, before me, the undersigned, personally appeared Jacqueline Tom, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public, State of New York

SONJA L. PINEDA
Notary Public, State of New York
No. 01PI6172910
Qualified in New York County
Commission Expires August 20, 2027

IN WITNESS WHEREOF, Grantor Leaseholder has caused this instrument to be signed in its name.

Coney Island Associates Phase 3 LLC:

By: _____

Print Name: DONALD CAPOCCIA

Title: Authorized Signatory Date: 9/15/25

Grantor Leaseholder's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF Kings)

On the 15th day of September, in the year 2025, before me, the undersigned, personally appeared DONALD CAPOCCIA, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

KEVIN FULLINGTON
NOTARY PUBLIC, STATE OF NEW YORK
Registration No. 02FU6402906
Qualified in Kings County
Commission Expires 02/14/2028

IN WITNESS WHEREOF, Grantor Beneficial Owner has caused this instrument to be signed in its name.

Coney Island Associates 3 Moderate LLC:

By: _____

Print Name: DONALD CAPOCCIA

Title: Authorized Signatory Date: 9/15/25

Grantor Beneficial Owner's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF KINGS)

On the 15th day of September, in the year 2025, before me, the undersigned, personally appeared DONALD CAPOCCIA, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

KEVIN FULLINGTON
NOTARY PUBLIC, STATE OF NEW YORK
Registration No. 02FU6402906
Qualified in Kings County
Commission Expires 02/14/2028

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting by and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: _____
Janet Brown, Assistant Division Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 29th day of September in the year 2025 before me, the undersigned, personally appeared Janet Brown, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York
Cheryl A. Salem
Notary Public State of New York
Registration No. 01SA0002177
Qualified in Albany County
My Commission Expires March 3, 2027

SCHEDULE "A" PROPERTY DESCRIPTION

Environmental Easement Legal Description

All that certain plot piece or parcel of land, situate lying and being in the Borough of Brooklyn, County of Kings, City and State of New York bounded and described as follows:

BEGINNING at the corner formed by the intersection of the easterly side of West 19th Street (60 feet wide) with the northerly side of Surf Avenue (120 feet wide);

RUNNING THENCE northerly along the easterly side of West 19th Street, 282.65 feet to a point;

RUNNING THENCE easterly parallel with the southerly side of Mermaid Avenue (80 feet wide), 237.62 feet to the westerly side of West 17th Street (60 feet wide);

RUNNING THENCE southerly along the westerly side of West 17th Street, 275.00 feet to the northerly side of Surf Avenue;

RUNNING THENCE westerly along the northerly side of Surf Avenue, 60.29 feet to a point of curvature;

RUNNING THENCE westerly continuing along the northerly side of Surf Avenue and along a curve bearing to the left having and radius of 2060.00 feet, an arc length of 177.55 feet to the point or place of BEGINNING.

Area: 65,797 square feet or 1.511 acres

Recorded Deed Descriptions

Lot 14 (Parcel 1):

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Brooklyn, County of Kings, City and State of New York, known and designated as Section 21, Block 7061, Lot 14 on the Tax Map of the City of New York for the Borough of Brooklyn, said premises more recently bounded and described in accordance with a survey made by Control Point Associates Inc., PC dated May 31, 2017 as follows:

BEGINNING at a point on the westerly side of West 17th Street, 100 feet south of the corner formed by the intersection of the southerly side of Mermaid Avenue with the westerly side of West 17th Street;

RUNNING thence southerly along the westerly side of West 17th Street, 40 feet to a point;

THENCE westerly parallel with the southerly side of Mermaid Avenue, 237.62 feet to the easterly side of West 19th Street;

THENCE northerly along the easterly side of West 19th Street, 40 feet to a point;

THENCE easterly parallel with the southerly side of Mermaid Avenue, 237.62 feet to the point or place of BEGINNING.

Area: 9,505 square feet or 0.218 acres

Lot 20 (Parcel 2):

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Brooklyn, County of Kings, City and State of New York, bounded and described as follows:

BEGINNING at a point on the westerly side of West 17th Street, distant 150 feet northerly from the corner formed by the intersection of the westerly side of West 17th Street with the northerly side of Surf Avenue;

RUNNING thence westerly at an interior angle of 90 degrees 00' 30" to West 17th Street, 127 feet 9-1/4 inches (Deed) 128.82 feet (Tax Map) 127.77 feet (Survey);

THENCE northerly at an interior angle of 89 degrees 19' 37" with the last mentioned course, 20 feet;

THENCE easterly at an interior angle of 90 degrees 40' 23" with the last mentioned course, 127 feet 6-1/4 inches (Deed) 128.61 feet (Tax Map) 127.54 feet (Survey) to the westerly side of West 17th Street;

THENCE southerly along the westerly side of West 17th Street, 20 feet to the point or place of BEGINNING.

Area: 2,553 square feet or 0.059 acres

Lot 27 (Parcel 3):

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Brooklyn, County of Kings, City and State of New York, bounded and described as follows:

BEGINNING at the corner formed by the intersection of the easterly side of West 19th Street with the northerly side of Surf Avenue;
THENCE northerly along the easterly side of West 19th Street, 151.65 feet to a point distant 246 feet southerly from the southeast corner of West 19th Street and Mermaid Avenue;

THENCE easterly parallel with Mermaid Avenue, 109.79 feet to the center line of Lot Number 28 on Map entitled, "Map of Common Land, Town of Gravesend" filed September 5, 1878;

THENCE southerly along said line, 34 feet;

THENCE easterly parallel with Mermaid Avenue, 68.25 feet (Deed) 68.23 feet (Tax Map and Survey) to a point in a line parallel with the westerly side of West 17th Street and distance 60 feet westerly therefrom;

THENCE southerly along said parallel line, 110 feet to the northerly side of Surf Avenue;

THENCE westerly along the northerly side of Surf Avenue, 177.84 feet (Deed) 177.55 feet (Tax Map and Survey) to the point or place of BEGINNING.

Area: 23,717 square feet or 0.544 acres

Lot 16 (Parcel 4):

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Brooklyn, County of Kings, City and State of New York, bounded and described as follows:

BEGINNING at a point on the westerly side of West 17th Street, 140 feet south of the corner formed by the intersection of the southerly side of Mermaid Avenue with the westerly side of West 17th Street;

RUNNING thence southerly along the westerly side of West 17th Street, 80 feet to a point;

THENCE westerly parallel with Mermaid Avenue 127.54 feet to a point;

THENCE southerly at an exterior angle of 90 degrees 40' 23" to the last described course 26 feet (Survey) 26.09 feet (Tax Map) to a point;

THENCE westerly parallel with Mermaid Avenue 109.79 feet to the easterly side of West 19th Street;

THENCE northerly along said easterly side of West 19th Street 106 feet;

THENCE easterly parallel with Mermaid Avenue 237.62 feet to a point on the westerly side of West 17th Street, said point being 140 feet south of the corner formed by the intersection of the southerly side of Mermaid Avenue with the westerly side of West 17th Street, which said point is also the point or place of BEGINNING.

Area: 21,868 square feet or 0.502 acres

Lot 21 (Parcel 5):

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Brooklyn, County of Kings, City and State of New York, bounded and described as follows:

BEGINNING at a point being the corner formed by the westerly side of West 17th Street and the northerly side of Surf Avenue;

THENCE westerly along said northerly side of Surf Avenue 60 feet to a point;

THENCE northerly parallel with West 17th Street 110 feet to a point;

THENCE westerly parallel with Mermaid Avenue 68.23 feet to a point;

THENCE northerly at an interior angle of 89 degrees 19' 37" to the last described course 40 feet to a point;

THENCE easterly parallel with Mermaid Avenue 127.77 feet to the westerly side of West 17th Street;

THENCE southerly along said westerly side of West 17th Street 150 feet to a point being the corner formed by the westerly side of West 17th Street and the northerly side of Surf Avenue, said point also being the point or place of BEGINNING.

Area: 11,719 square feet or 0.269 acres

TITLE NO.

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the New York Environmental Conservation Law.

THE ENGINEERING AND INSTITUTIONAL CONTROLS for the Easement are set forth in more detail in the Site Management Plan ("SMP"). A copy of the SMP must be obtained by any party with an interest in the property. The SMP may be obtained from the New York State Department of Environmental Conservation, Division of Environmental Remediation, Site Control Section, 625 Broadway, Albany, NY 12233 or at derweb@dec.ny.gov.

ENVIRONMENTAL EASEMENT AREA ACCESS

THE DEC OR THEIR AGENT MAY ACCESS THE ENVIRONMENTAL EASEMENT AREA AS SHOWN HEREON THROUGH ANY EXISTING STREET ACCESS OR BUILDING INGRESS/EGRESS ACCESS POINT.

ENVIRONMENTAL EASEMENT BOUNDARY

VICINITY MAP
NOT TO SCALE

LEGAL DESCRIPTION

PARCEL 1 (Block 7061, Lot 14)

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Brooklyn, County of Kings, City and State of New York, known and designated as Section 21, Block 7061, Lot 14 on the Tax Map of the City of New York for the Borough of Brooklyn, said premises more recently bounded and described in accordance with a survey made by Control Point Associates Inc., PC dated May 31, 2017 as follows:

BEGINNING at a point on the westerly side of West 17th Street, 100 feet south of the corner formed by the intersection of the southerly side of Mermaid Avenue with the westerly side of West 17th Street;

RUNNING thence southerly along the westerly side of West 17th Street, 40 feet to a point;

THENCE westerly parallel with the southerly side of Mermaid Avenue, 237.62 feet to the easterly side of West 19th Street;

THENCE northerly along the easterly side of West 19th Street, 40 feet to a point;

THENCE easterly parallel with the southerly side of Mermaid Avenue, 237.62 feet to the point or place of BEGINNING.

The above described parcel having an area of 9,505 square feet or 0.218 acre.

PARCEL 2 (Block 7061, Lot 20)

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Brooklyn, County of Kings, City and State of New York, bounded and described as follows:

BEGINNING at a point on the westerly side of West 17th Street, distant 150 feet northerly from the corner formed by the intersection of the westerly side of West 17th Street with the northerly side of Surf Avenue;

RUNNING thence westerly at an interior angle of 90 degrees 00' 30" to West 17th Street, 127 feet 9-1/4 inches (Deed) 128.82 feet (Tax Map) 127.77 feet (Survey);

THENCE northerly at an interior angle of 89 degrees 19' 37" with the last mentioned course, 20 feet;

THENCE easterly at an interior angle of 90 degrees 40' 23" with the last mentioned course, 127 feet 6-1/4 inches (Deed) 128.61 feet (Tax Map) 127.54 feet (Survey) to the westerly side of West 17th Street;

THENCE southerly along the westerly side of West 17th Street, 20 feet to the point or place of BEGINNING.

The above described parcel having an area of 2,553 square feet or 0.059 acre.

PARCEL 3 (Block 7061, Lot 27)

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Brooklyn, County of Kings, City and State of New York, bounded and described as follows:

BEGINNING at the corner formed by the intersection of the easterly side of West 19th Street with the northerly side of Surf Avenue;

THENCE northerly along the easterly side of West 19th Street, 151.65 feet to a point distant 246 feet southerly from the southeast corner of West 19th Street and Mermaid Avenue;

THENCE easterly parallel with Mermaid Avenue, 109.79 feet to the center line of Lot Number 28 on Map entitled, "Map of Common Land, Town of Gravesend" filed September 5, 1878;

THENCE southerly along said line, 34 feet;

THENCE easterly parallel with Mermaid Avenue, 68.25 feet (Deed) 68.23 feet (Tax Map and Survey) to a point in a line parallel with the westerly side of West 17th Street and distance 80 feet westerly therefrom;

THENCE southerly along said parallel line, 110 feet to the northerly side of Surf Avenue;

THENCE westerly along the northerly side of Surf Avenue, 177.84 feet (Deed) 177.55 feet (Tax Map and Survey) to the point or place of BEGINNING.

The above described parcel having an area of 23,717 square feet or 0.544 acre.

PARCEL 4 (Block 7061, Lot 16)

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Brooklyn, County of Kings, City and State of New York, bounded and described as follows:

BEGINNING at a point on the westerly side of West 17th Street, 140 feet south of the corner formed by the intersection of the southerly side of Mermaid Avenue with the westerly side of West 17th Street;

RUNNING thence southerly along the westerly side of West 17th Street, 80 feet to a point;

THENCE westerly parallel with Mermaid Avenue 127.54 feet to a point;

THENCE southerly at an exterior angle of 90 degrees 40' 23" to the last described course 26 feet (Survey) 26.09' (Tax Map) to a point;

THENCE westerly parallel with Mermaid Avenue 109.79 feet to the easterly side of West 19th Street;

THENCE northerly along said easterly side of West 19th Street 106 feet;

THENCE easterly parallel with Mermaid Avenue 237.62 feet to a point on the westerly side of West 17th Street, said point being 140 feet south of the corner formed by the intersection of the southerly side of Mermaid Avenue with the westerly side of West 17th Street, which said point is also the point or place of BEGINNING.

The above described parcel having an area of 21,868 square feet or 0.502 acre.

PARCEL 5 (Block 7061, Lot 21)

ALL that certain plot, piece or parcel of land situate, lying and being in the Borough of Brooklyn, County of Kings, City and State of New York, bounded and described as follows:

BEGINNING at a point being the corner formed by the westerly side of West 17th Street and the northerly side of Surf Avenue;

THENCE westerly along said northerly side of Surf Avenue 60 feet to a point;

THENCE northerly parallel with West 17th Street 110 feet to a point;

THENCE westerly parallel with Mermaid Avenue 68.23 feet to a point;

THENCE northerly at an interior angle of 89 degrees 19' 37" to the last described course 40 feet to a point;

THENCE easterly parallel with Mermaid Avenue 127.77 feet to the westerly side of West 17th Street;

THENCE southerly along said westerly side of West 17th Street 150 feet to a point being the corner formed by the westerly side of West 17th Street and the northerly side of Surf Avenue, said point also being the point or place of BEGINNING.

The above described parcel having an area of 11,719 square feet or 0.269 acre.

ENVIRONMENTAL EASEMENT DESCRIPTION

All that certain plot piece or parcel of land, situate lying and being in the Borough of Brooklyn, County of Kings, City and State of New York bounded and described as follows:

BEGINNING at the corner formed by the intersection of the easterly side of West 19th Street (60 feet wide) with the northerly side of Surf Avenue (120 feet wide);

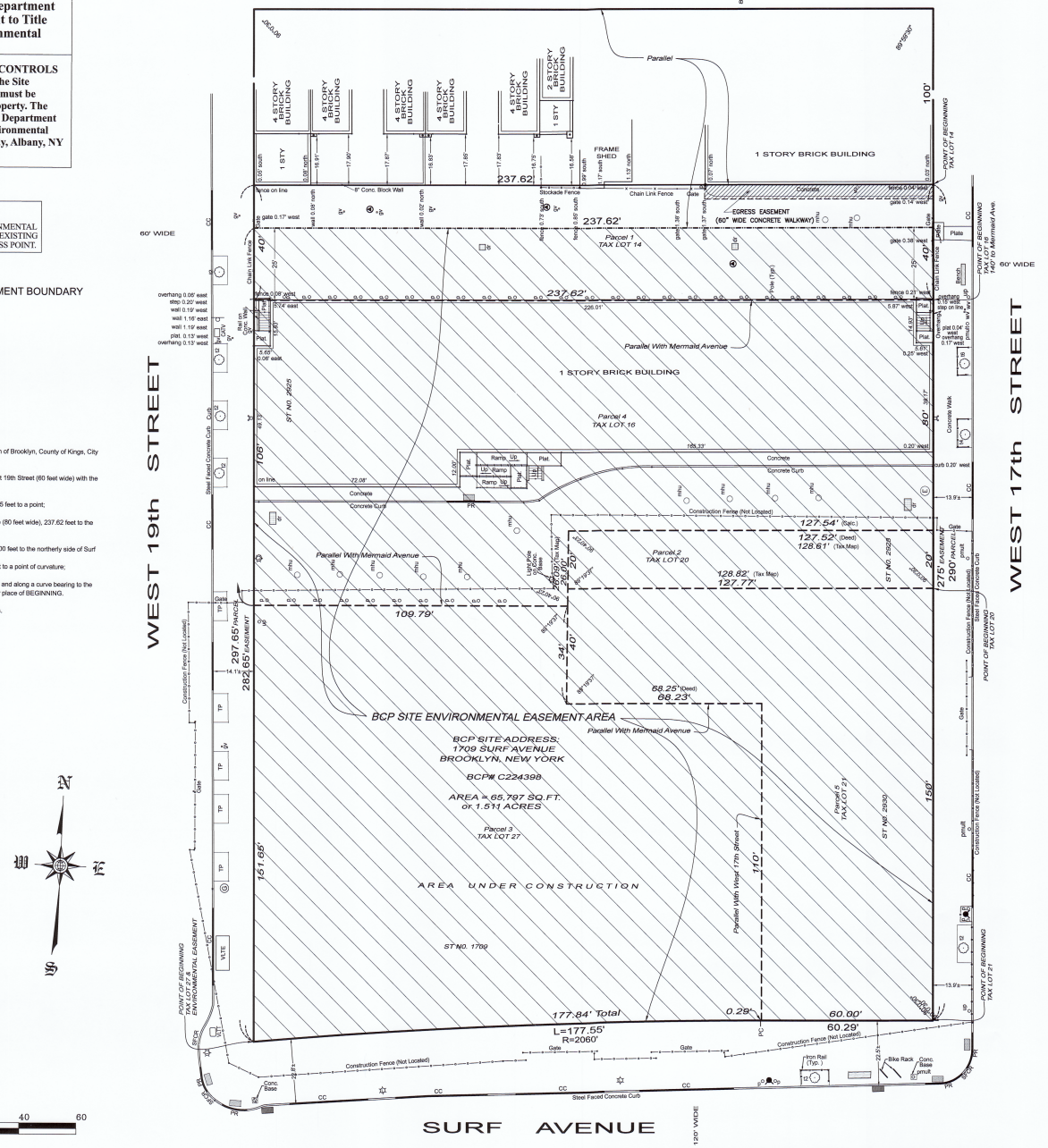
RUNNING THENCE northerly along the easterly side of West 19th Street, 282.65 feet to a point;

RUNNING THENCE easterly parallel with the southerly side of Mermaid Avenue (80 feet wide), 237.62 feet to the westerly side of West 17th Street (60 feet wide);

RUNNING THENCE southerly along the westerly side of West 17th Street, 275.00 feet to the northerly side of Surf Avenue;
RUNNING THENCE westerly along the northerly side of Surf Avenue, 60.29 feet to a point of curvature;

RUNNING THENCE westerly continuing along the northerly side of Surf Avenue and along a curve bearing to the left having and radius of 2060.00 feet, an arc length of 177.55 feet to the point or place of BEGINNING.

The above described parcel having an area of 65,797 square feet or 1.511 acres.



LEGEND

ASPH.....ASPHALT
BK.....BRICK
BSMT.....BASEMENT
CC.....CURB CUT
CCR.....CONCRETE CURB ROUND
CD.....CELLAR DOOR
CLF.....CHAIN LINK FENCE
CO.....CATCH BASIN CLEAN OUT
CONC.....CONCRETE
CRF.....CHAIN ROPE FENCE
CWA.....CELLAR WINDOW AREA
DR.....DRAIN
EL.....ELEVATION
FAB.....FIRE ALARM BOX
FC.....FILL CAP
FL EL.....FLOOR ELEVATION
GP.....GUARD POLE
GV.....GAS VALVE
IF.....IRON FENCE
INL.....CATCH BASIN INLET ELEVATION
INV.....SEWER INVERT ELEVATION
LP.....LIGHT POLE
MB.....MAIL BOX
MHU.....UNKNOWN MANHOLE
OF.....OIL FILL
OHW.....OVERHEAD WIRES
P.....POLE
PAVT.....PAVEMENT
PM.....PARKING METER
PMULT.....POLE, MULTIPLE USAGE
PR.....PEDESTRIAN RAMP
RET.....RETAINING
RIM.....RIM ELEVATION SEWER MANHOLE
SFCR.....STEEL FACED CURB ROUND
STY.....STORY
TB.....TOP OF BANK ELEVATION
TF.....TRAFFIC LIGHT
TEL.....TELEPHONE
TP.....TREE PIT
TS.....TRAFFIC SIGN
TW.....ELEVATION AT TOP OF WALL
UP.....UTILITY POLE
VU.....VALVE UNKNOWN
VLTU.....VAULT UNKNOWN
VP.....VENT PIPE
WV.....WATER VALVE
12"GS.....GAS MAIN WITH SIZE
12"S.....SEWER MAIN WITH SIZE
12"W.....WATER MAIN WITH SIZE
.....CATCH BASIN
E.....ELECTRIC MANHOLE / VAULT
F.....FIRE MANHOLE
G.....GAS MANHOLE
S.....SEWER MANHOLE
T.....TELEPHONE MANHOLE
W.....WATER MANHOLE
TB.....TRAFFIC VAULT
.....HYDRANT
T8.....TREE WITH SIZE

SCHEDULE B ITEMS

7. Associates LLC dated October 24, 2017 and recorded January 18, 2018 in CRFN 2018000021233. Affects Parcel 1 and more.

8. Egress Easement Agreement made by 1706 Surf Avenue Associates LLC and 1709 Surf Avenue Associates LLC dated October 24, 2017 and recorded January 18, 2018 in CRFN 2018000021234. Affects Parcel 1 and more.

10. Declaration of Restrictive Covenant dated as of June 29, 2018 made by and between Coney Island Associates Phase 3 LLC and The City of New York, acting by and through its Department of Housing Preservation and Development, recorded July 11, 2018 in CRFN 2018000228084. Affects Parcels 1 – 3.

11. Stormwater Maintenance Easement made by and between Coney Island Associates Phase 3 LLC and The City of New York c/o Department of Environmental Protection dated as of January 3, 2025 and recorded January 23, 2025 in CRFN 2025000020676. As to Parcel 1.

12. Stormwater Maintenance Easement made by and between Coney Island Associates Phase 3 LLC and The City of New York c/o Department of Environmental Protection dated as of January 3, 2025 and recorded January 23, 2025 in CRFN 2025000020677. As to Parcel 2.

13. Stormwater Maintenance Easement made by and between Coney Island Associates Phase 3 LLC and The City of New York c/o Department of Environmental Protection dated as of January 3, 2025 and recorded January 23, 2025 in CRFN 2025000020678. As to Parcel 3.

FLOOD HAZARD NOTE

THE PARCEL SURVEYED IS COMPRISED OF AREAS DESIGNATED AS
ZONE AE (EL 10 NGVD 1929) (EL 8.8 NAVD 1988)
FEDERAL EMERGENCY MANAGEMENT AGENCY
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP
COMMUNITY PANEL NUMBER 360497 0353 F
EFFECTIVE DATE SEPTEMBER 5, 2007

PRELIMINARY FLOOD HAZARD NOTE

THE PARCEL SURVEYED IS COMPRISED OF AREAS DESIGNATED AS
ZONE AE (EL11 NAVD 1988)
FEDERAL EMERGENCY MANAGEMENT AGENCY
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP
COMMUNITY PANEL NUMBER 360497 0353 G
PRELIMINARY JANUARY 30, 2015

BROOKLYN HIGHWAY DATUM
0.84'
BROOKLYN SEWER DATUM
MEAN SEA LEVEL 0.00 (NAVD 1988)
1.46'
MEAN SEA LEVEL 0.00 (NGVD1929)

NAVD 1988 DATUM IS 1.46 FEET BELOW THE BROOKLYN HIGHWAY DATUM

DRAWN: J.R.

REV	DATE	DESCRIPTION	ck

REV	DATE	DESCRIPTION	ck
	05–20–25	ENVIRONMENTAL EASEMENT SURVEY	

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CITY & LAND SURVEYORS
116 20 METROPOLITAN AVE * RICHMOND HILL, NY 11418-1090 * (718) 849-0600
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STATE OF NEW YORK SAEED JALILVAND 050236 LICENSED LAND SURVEYOR

CITY OF NEW YORK
COUNTY KINGS
TAX BLOCK 7061
TAX LOTS AS SHOWN
SCALE: 1" = 20'

ESTABLISHED 1876 * SUCCESSOR TO:
B.G. MENKHEIM C.S.*C.U. POWELL C.E.,C.S.*L.C.L. SMITH C.S.*NATHAN CAMPBELL C.E.,C.S.*A.U. WHITSON C.E.,C.S.*
WILLIAM L. SAVACOOL C.E.,L.S.,C.S.*A.U. WHITSON INC. C.E.,C.S.*G. WEBER L.S.,C.S.*C. STEDLPH R.A.,L.S.*WHITSON & POWELL INC. P.E.,L.S.,C.S.*KELLER & POWELL P.E.,L.S.,C.S.*LOUIS MONTROSE C.E.,L.S.,C.S.*FRED J. POWELL P.E.,L.S.,C.S.*

APPENDIX B

LIST OF SITE CONTACTS

APPENDIX B - LIST OF SITE CONTACTS

1709 SURF AVENUE
BROOKLYN, NEW YORK
BROWNFIELD CLEANUP PROGRAM SITE NO. C224398

Key contacts for this project are as follows:

Site Owner and Remedial Party:	Owner: Coney Island Associates Phase 3 LLC c/o BFC Partners Representative: Donald Capoccia Telephone: (718) 422-9999 E-mail: dac@bfcnyc.com
Remedial Party's Consultant:	Langan Engineering Program Manager Mr. Brian Gochenaur Telephone: (212) 479-5479 E-mail: bgochenaur@langan.com Langan Engineering Project Manager Mrs. Lamees Esmail, P.E. Telephone: (212) 479-5499 E-mail: lesmail@langan.com Langan Engineering Health & Safety Officer Mr. Tony Moffa Telephone: (215) 756-2523 E-mail: tmoffa@langan.com Langan Engineering Field Safety Officer Mr. William Bohrer, P.G. Telephone: (212) 479-5533 E-mail: wbohrer@langan.com
Qualified Environmental Professional:	Langan Engineering Principal Mr. Michael Burke, P.G., CHMM Telephone: (212) 479-5413 E-mail: mburke@langan.com

NYSDEC:

NYSDEC Chief of the Division of Environmental Remediation
Ms. Lisa Gorton
Telephone: (518) 402-0193
E-mail: lisa.gorton@dec.ny.gov

NYSDEC Attorney
Leia Schmidt
Telephone: (518) 402-9195
E-mail: leia.schmidt@dec.ny.gov

NYSDEC Project Manager
Meghan Medwid
Phone No.: (518) 402-8610
Email: meghan.medwid@dec.ny.gov

NYSDEC Site Control
Ms. Kelly Lewandowski
Telephone: (518) 402-9543
E-mail: Kelly.lewandowski@dec.ny.gov

NYSDOH Project Manager
Angela Martin
Phone No.: (518) 473-4671
Email: beei@health.ny.gov

Remedial Party's Attorney:

Sive, Paget & Riesel P.C.
Mr. Michael Bogin, Esq.
Telephone: (646) 378-7210
E-mail: mbogin@sprlaw.com

APPENDIX C

RESPONSIBILITIES OF OWNER AND REMEDIAL PARTY

APPENDIX C – RESPONSIBILITIES OF OWNER AND REMEDIAL PARTY

Responsibilities

The responsibility for implementing the Site Management Plan ("SMP") for the **1709 Surf Avenue** site (the "site"), site number **C224398**, is divided between the site owner and Remedial Party, as defined below. The owner of the site is currently:

Coney Island Associates Phase 3 LLC c/o BFC Partners (the "owner")
150 Myrtle Avenue, Suite 2
Brooklyn, NY

Solely for the purposes of this document and based upon the facts related to a particular site and the remedial program being carried out, the term Remedial Party ("RP") refers to any of the following: Certificate of Completion (COC) holder, volunteer, applicant, responsible party, and, in the event the New York State Department of Environmental Conservation ("NYSDEC") is carrying out remediation or site management, the NYSDEC and/or an agent acting on its behalf. The RP is:

Coney Island Associates Phase 3 LLC c/o BFC Partners (the "Volunteers")
150 Myrtle Avenue, Suite 2
Brooklyn, NY

Nothing on this page shall supersede the provisions of an Environmental Easement (EE), Consent Order, Consent Decree, agreement, or other legally binding document that affects rights and obligations relating to the site.

Site Owner's Responsibilities

1. The owner and RP shall follow the provisions of the SMP as they relate to future construction and excavation at the site.
2. In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls (ICs) set forth in the EE remain in place and continue to be complied with. The owner shall provide written certification to the RP, upon the RP's request, in order to allow the RP to include the certification in the site's Periodic Review Report (PRR) certification to the NYSDEC.
3. In the event the site is delisted, the owner remains bound by the EE and shall submit, upon request by the NYSDEC, a written certification that the EE is still in place and have been complied with.
4. The owner shall grant access to the site to the RP and the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.
5. The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. If damage to the remedial components or vandalism is evident, the owner shall notify the site's RP and the NYSDEC in accordance with the timeframes indicated in Section 1.3 - Notifications.
6. If some action or inaction by the owner and RP adversely impacts the site, the owner and RP must notify the NYSDEC in accordance with the time frame indicated in Section 1.3 - Notifications and coordinate the performance of necessary corrective actions with the RP.
7. The owner must notify the RP and the NYSDEC of any change in ownership of the site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the site property. NYSDEC Title 6 New York Codes, Rules, and Regulations (NYCRR) Part 360 contains notification requirements applicable to any construction or activity changes and changes in ownership. Among the notification requirements is the following: sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 1.3 of the SMP. A 60-Day Advance Notification Form and Instructions are found at https://www.dec.ny.gov/chemical/76250.html.

8. Until such time as the NYSDEC deems the vapor mitigation system unnecessary, the owner shall operate the system, pay for the utilities for the system's operation, and report any maintenance issues to the RP and the NYSDEC.
9. In accordance with the tenant notification law, within 15 days of receipt, the owner must supply a copy of any vapor intrusion data, that is produced with respect to structures and that exceeds New York State Department of Health (NYSDOH) or Occupational Safety and Health Administration (OSHA) guidelines on the site, whether produced by the NYSDEC, RP/owner, to the tenants on the property. The owner must otherwise comply with the tenant and occupant notification provisions of Environmental Conservation Law Article 27, Title 24.

Remedial Party's (BCP Volunteer) Responsibilities

1. The RP must follow the SMP provisions regarding any construction and/or excavation it undertakes at the site.
2. The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.
3. Before accessing the site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the site visit and/or any final report produced.
4. If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner.
5. The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the operation, maintenance, and monitoring of and reporting with respect to any remedial system (engineering controls [ECs]). The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html.

6. The RP shall notify the NYSDEC of any damage to or modification of the systems as required under Section 1.3 - Notifications of the SMP.
7. The RP is responsible for the proper maintenance of any installed vapor intrusion mitigation systems associated with the site, as required in Section 5.0 or Appendix N (Operation, Monitoring and Maintenance Manual) of the SMP.
8. Prior to a change in use that impacts the remedial system or requirements and/or responsibilities for implementing the SMP, the owner and RP shall submit to the NYSDEC for approval an amended SMP.
9. Any change in use, change in ownership, change in site classification (e.g., delisting), reduction or expansion of remediation, and other significant changes related to the site may result in a change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP shall contact the Department to discuss the need to update such documents.

Change in RP ownership and/or control and/or site ownership does not affect the owner and RP's obligations with respect to the site unless a legally binding document executed by the NYSDEC releases the owner and RP of its obligations.

Future site owners and RPs and their successors and assigns are required to carry out the activities set forth above.

APPENDIX D

PREVIOUS REPORTS
(PROVIDED UNDER SEPARATE COVER)

APPENDIX E

GROUNDWATER MONITORING WELL CONSTRUCTION LOGS AND DOCUMENTATION

MONITORING WELL CONSTRUCTION AND DEVELOPMENT SUMMARY

Well No. **RMW01**

PROJECT		PROJECT NO.	
1709 Surf Avenue		170747001	
LOCATION		**ELEVATION AND DATUM**	
New York, NY		el. 4 NAVD88	
DRILLING AGENCY		**DATE STARTED**	**DATE FINISHED**
Lakewood Environmental Services Corp		9/12/2025	9/12/2025
DRILLING EQUIPMENT		**DRILLER**	
Geoprobe 66DT		Mike Kolasinski	
SIZE AND TYPE OF BIT		**INSPECTOR**	
3.75" Expendable Well Point		Aron Farber	
BOREHOLE DIAMETER		**TYPE OF WELL (OVERBURDEN / BEDROCK)**	
3.75 inches		Overburden	
RISER MATERIAL	**DIAMETER**	**TYPE OF BACKFILL MATERIAL**	
PVC	2"	Clean sand	
TYPE OF SCREEN	**DIAMETER**	**TYPE OF WELL PACK**	**TYPE OF SEAL MATERIAL**
PVC No. 10 Slot	2"	Prepacked 20/40 Sand	N/A

METHOD OF INSTALLATION

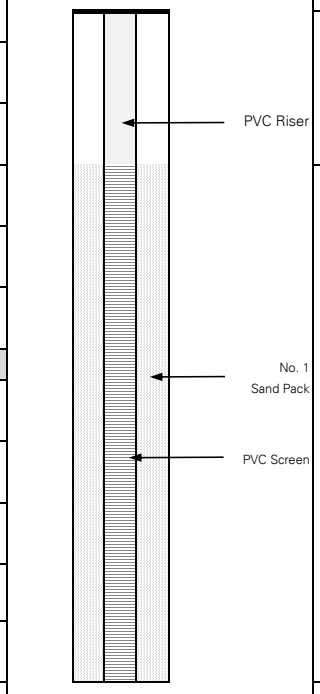
Lakewood used a Geoprobe 66DT drill rig to advance the boring to approximately 10 feet below grade surface (bgs). A 2-inch polyvinyl chloride (PVC) monitoring well was installed which consisted of 10 feet of 10 slot (0.010-inch) pre-packed well screen, and a solid 2" PVC riser. Well screen was installed from approximately 5 to 15 feet bgs with riser from grade surface to approximately 3 feet above grade surface.

WELL DEVELOPMENT DATA

SURGE BLOCK DIAMETER	N/A	**TYPE PUMP**	Peristaltic Pump	**DEVELOPMENT CONFIRMATION**
DRILLER OR LANGAN	Driller	**MAX PUMP RATE**	0.25 gal/min	The well was purged until water was clear.
NUMBER OF SURGE CYCLES	N/A	**TOTAL VOLUME**	5 gallons	

	ELEVATION	DEPTH (ft)
TOP OF CASING	7	N/A
TOP OF SEAL	N/A	N/A
TOP OF FILTER	-1.0	5.0
TOP OF SCREEN	-1.0	5.0
BOTTOM OF BORING	-11.0	15.0
SCREEN LENGTH		10
SLOT SIZE		No. 10 Slot; 0.010 Inches

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
Top of PVC Riser	-3.0
Top of Filter/Screen	5.0
Bottom of Boring/Screen	15.0

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
2.94	9/18/2025	1.06 ft

LANGAN Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.

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MONITORING WELL CONSTRUCTION AND DEVELOPMENT SUMMARY

Well No. **RMW02**

PROJECT		PROJECT NO.	
1709 Surf Avenue		170747001	
LOCATION		**ELEVATION AND DATUM**	
New York, NY		el. 1 NAVD88	
DRILLING AGENCY		**DATE STARTED**	**DATE FINISHED**
Lakewood Environmental Services Corp		9/10/2025	9/10/2025
DRILLING EQUIPMENT		**DRILLER**	
Geoprobe 66DT		Mike Kolasinski	
SIZE AND TYPE OF BIT		**INSPECTOR**	
3.75" Expendable Well Point		Aron Farber	
BOREHOLE DIAMETER		**TYPE OF WELL (OVERBURDEN / BEDROCK)**	
3.75 inches		Overburden	
RISER MATERIAL	**DIAMETER**	**TYPE OF BACKFILL MATERIAL**	
PVC	2"	Clean sand	
TYPE OF SCREEN	**DIAMETER**	**TYPE OF WELL PACK**	**TYPE OF SEAL MATERIAL**
PVC No. 10 Slot	2"	Prepacked 20/40 Sand	N/A

METHOD OF INSTALLATION

Lakewood used a Geoprobe 66DT drill rig to advance the boring to approximately 10 feet below grade surface (bgs). A 2-inch polyvinyl chloride (PVC) monitoring well was installed which consisted of 10 feet of 10 slot (0.010-inch) pre-packed well screen, and a solid 2" PVC riser. Well screen was installed from approximately 5 to 15 feet bgs with riser from grade surface to approximately 6 feet above grade surface.

WELL DEVELOPMENT DATA

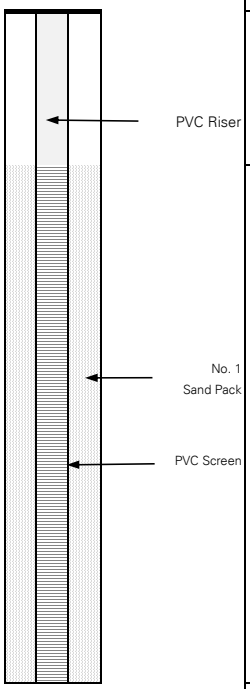
SURGE BLOCK DIAMETER	N/A	**TYPE PUMP**	Peristaltic Pump	**DEVELOPMENT CONFIRMATION**
DRILLER OR LANGAN	Driller	**MAX PUMP RATE**	0.25 gal/min	The well was purged until water was clear.
NUMBER OF SURGE CYCLES	N/A	**TOTAL VOLUME**	5 gallons	

TOP OF CASING	ELEVATION	DEPTH (ft)
	7	N/A
TOP OF SEAL	**ELEVATION**	**DEPTH (ft)**
	N/A	N/A
TOP OF FILTER	**ELEVATION**	**DEPTH (ft)**
	-4.0	5.0
TOP OF SCREEN	**ELEVATION**	**DEPTH (ft)**
	-4.0	5.0
BOTTOM OF BORING	**ELEVATION**	**DEPTH (ft)**
	-14.0	15.0
SCREEN LENGTH		10
SLOT SIZE		No. 10 Slot; 0.010 Inches

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
-0.47	9/18/2025	1.47 ft

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
Top of PVC Riser	-6.0
Top of Filter/Screen	5.0
Bottom of Boring/Screen	15.0

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MONITORING WELL CONSTRUCTION AND DEVELOPMENT SUMMARY

Well No. **RMW03**

PROJECT		PROJECT NO.	
1709 Surf Avenue		170747001	
LOCATION		**ELEVATION AND DATUM**	
New York, NY		el. 4 NAVD88	
DRILLING AGENCY		**DATE STARTED**	**DATE FINISHED**
Lakewood Environmental Services Corp		9/10/2025	9/10/2025
DRILLING EQUIPMENT		**DRILLER**	
Geoprobe 66DT		Mike Kolasinski	
SIZE AND TYPE OF BIT		**INSPECTOR**	
3.75" Expendable Well Point		Aron Farber	
BOREHOLE DIAMETER		**TYPE OF WELL (OVERBURDEN / BEDROCK)**	
3.75 inches		Overburden	
RISER MATERIAL	**DIAMETER**	**TYPE OF BACKFILL MATERIAL**	
PVC	2"	Clean sand	
TYPE OF SCREEN	**DIAMETER**	**TYPE OF WELL PACK**	**TYPE OF SEAL MATERIAL**
PVC No. 10 Slot	2"	Prepacked 20/40 Sand	N/A

METHOD OF INSTALLATION

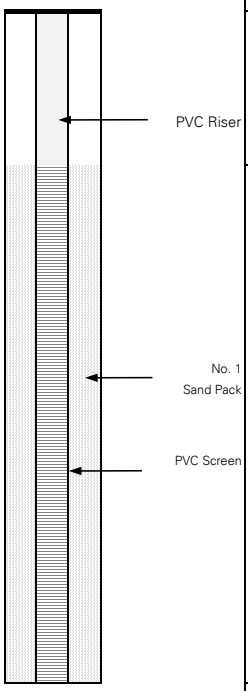
Lakewood used a Geoprobe 66DT drill rig to advance the boring to approximately 10 feet below grade surface (bgs). A 2-inch polyvinyl chloride (PVC) monitoring well was installed which consisted of 10 feet of 10 slot (0.010-inch) pre-packed well screen, and a solid 2" PVC riser. Well screen was installed from approximately 7 to 17 feet bgs with riser from grade surface to approximately 3 feet above grade surface.

WELL DEVELOPMENT DATA

SURGE BLOCK DIAMETER	N/A	**TYPE PUMP**	Peristaltic Pump	**DEVELOPMENT CONFIRMATION**
DRILLER OR LANGAN	Driller	**MAX PUMP RATE**	0.25 gal/min	The well was purged until water was clear.
NUMBER OF SURGE CYCLES	N/A	**TOTAL VOLUME**	5 gallons	

TOP OF CASING	**ELEVATION** 7	**DEPTH (ft)** N/A
TOP OF SEAL	**ELEVATION** N/A	**DEPTH (ft)** N/A
TOP OF FILTER	**ELEVATION** -3.0	**DEPTH (ft)** 7.0
TOP OF SCREEN	**ELEVATION** -3.0	**DEPTH (ft)** 7.0
BOTTOM OF BORING	**ELEVATION** -13.0	**DEPTH (ft)** 17.0
SCREEN LENGTH		10
SLOT SIZE		No. 10 Slot; 0.010 Inches

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
Top of PVC Riser	-3.0
Top of Filter/Screen	7.0
Bottom of Boring/Screen	17.0

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
2.5	9/18/2025	1.5 ft

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MONITORING WELL CONSTRUCTION AND DEVELOPMENT SUMMARY

Well No. **RMW04**

PROJECT		PROJECT NO.	
1709 Surf Avenue		170747001	
LOCATION		**ELEVATION AND DATUM**	
New York, NY		el. 9 NAVD88	
DRILLING AGENCY		**DATE STARTED**	**DATE FINISHED**
Lakewood Environmental Services Corp		9/12/2025	9/12/2025
DRILLING EQUIPMENT		**DRILLER**	
Geoprobe 66DT		Mike Kolasinski	
SIZE AND TYPE OF BIT		**INSPECTOR**	
3.75" Expendable Well Point		Aron Farber	
BOREHOLE DIAMETER		**TYPE OF WELL (OVERBURDEN / BEDROCK)**	
3.75 inches		Overburden	
RISER MATERIAL	**DIAMETER**	**TYPE OF BACKFILL MATERIAL**	
PVC	2"	Clean sand	
TYPE OF SCREEN	**DIAMETER**	**TYPE OF WELL PACK**	**TYPE OF SEAL MATERIAL**
PVC No. 10 Slot	2"	Prepacked 20/40 Sand	N/A

METHOD OF INSTALLATION

Lakewood used a Geoprobe 66DT drill rig to advance the boring to approximately 10 feet below grade surface (bgs). A 2-inch polyvinyl chloride (PVC) monitoring well was installed which consisted of 10 feet of 10 slot (0.010-inch) pre-packed well screen, and a solid 2" PVC riser. Well screen was installed from approximately 0 to 10 feet bgs with riser from grade surface to approximately 3 feet above grade surface.

WELL DEVELOPMENT DATA

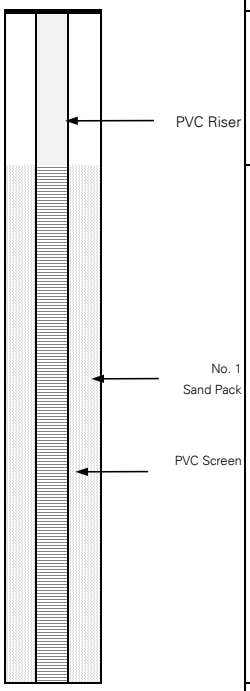
SURGE BLOCK DIAMETER	N/A	**TYPE PUMP**	Peristaltic Pump	**DEVELOPMENT CONFIRMATION**
DRILLER OR LANGAN	Driller	**MAX PUMP RATE**	0.25 gal/min	The well was purged until water was clear.
NUMBER OF SURGE CYCLES	N/A	**TOTAL VOLUME**	5 gallons	

TOP OF CASING	**ELEVATION** 12	**DEPTH (ft)** N/A
TOP OF SEAL	**ELEVATION** N/A	**DEPTH (ft)** N/A
TOP OF FILTER	**ELEVATION** 4.0	**DEPTH (ft)** 5.0
TOP OF SCREEN	**ELEVATION** 4.0	**DEPTH (ft)** 5.0
BOTTOM OF BORING	**ELEVATION** -6.0	**DEPTH (ft)** 15.0
SCREEN LENGTH		10
SLOT SIZE		No. 10 Slot; 0.010 Inches

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
2.88	9/19/2025	6.12 ft

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
Top of PVC Riser	-3.0
Top of Filter/Screen	5.0
Bottom of Boring/Screen	15.0

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MONITORING WELL CONSTRUCTION AND DEVELOPMENT SUMMARY

Well No. **RMW05**

PROJECT		PROJECT NO.	
1709 Surf Avenue		170747001	
LOCATION		**ELEVATION AND DATUM**	
New York, NY		el. 7 NAVD88	
DRILLING AGENCY		**DATE STARTED**	**DATE FINISHED**
Lakewood Environmental Services Corp		9/12/2025	9/12/2025
DRILLING EQUIPMENT		**DRILLER**	
Geoprobe 66DT		Mike Kolasinski	
SIZE AND TYPE OF BIT		**INSPECTOR**	
3.75" Expendable Well Point		Aron Farber	
BOREHOLE DIAMETER		**TYPE OF WELL (OVERBURDEN / BEDROCK)**	
3.75 inches		Overburden	
RISER MATERIAL	**DIAMETER**	**TYPE OF BACKFILL MATERIAL**	
PVC	2"	Clean sand	
TYPE OF SCREEN	**DIAMETER**	**TYPE OF WELL PACK**	**TYPE OF SEAL MATERIAL**
PVC No. 10 Slot	2"	Prepacked 20/40 Sand	N/A

METHOD OF INSTALLATION

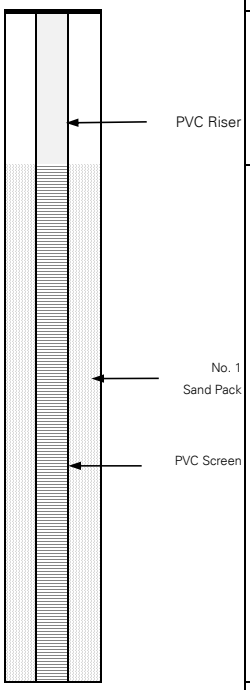
Lakewood used a Geoprobe 66DT drill rig to advance the boring to approximately 10 feet below grade surface (bgs). A 2-inch polyvinyl chloride (PVC) monitoring well was installed which consisted of 10 feet of 10 slot (0.010-inch) pre-packed well screen, and a solid 2" PVC riser. Well screen was installed from approximately 3 to 13 feet bgs with riser from grade surface to approximately 3 feet above grade surface.

WELL DEVELOPMENT DATA

SURGE BLOCK DIAMETER	N/A	**TYPE PUMP**	Peristaltic Pump	**DEVELOPMENT CONFIRMATION**
DRILLER OR LANGAN	Driller	**MAX PUMP RATE**	0.25 gal/min	The well was purged until water was clear.
NUMBER OF SURGE CYCLES	N/A	**TOTAL VOLUME**	5 gallons	

TOP OF CASING **ELEVATION** 10	**DEPTH (ft)** N/A	
TOP OF SEAL **ELEVATION** N/A	**DEPTH (ft)** N/A	
TOP OF FILTER **ELEVATION** 4.0	**DEPTH (ft)** 3.0	
TOP OF SCREEN **ELEVATION** 4.0	**DEPTH (ft)** 3.0	
BOTTOM OF BORING **ELEVATION** -6.0	**DEPTH (ft)** 13.0	
SCREEN LENGTH	10	
SLOT SIZE	No. 10 Slot; 0.010 Inches	

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
Top of PVC Riser	-3.0
Top of Filter/Screen	3.0
Bottom of Boring/Screen	13.0

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
2.11	9/18/2025	4.89 ft

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MONITORING WELL CONSTRUCTION AND DEVELOPMENT SUMMARY

Well No. **RMW06**

PROJECT		PROJECT NO.	
1709 Surf Avenue		170747001	
LOCATION		**ELEVATION AND DATUM**	
New York, NY		el. 9 NAVD88	
DRILLING AGENCY		**DATE STARTED**	**DATE FINISHED**
Lakewood Environmental Services Corp		9/12/2025	9/12/2025
DRILLING EQUIPMENT		**DRILLER**	
Geoprobe 66DT		Mike Kolasinski	
SIZE AND TYPE OF BIT		**INSPECTOR**	
3.75" Expendable Well Point		Aron Farber	
BOREHOLE DIAMETER		**TYPE OF WELL (OVERBURDEN / BEDROCK)**	
3.75 inches		Overburden	
RISER MATERIAL	**DIAMETER**	**TYPE OF BACKFILL MATERIAL**	
PVC	2"	Clean sand	
TYPE OF SCREEN	**DIAMETER**	**TYPE OF WELL PACK**	**TYPE OF SEAL MATERIAL**
PVC No. 10 Slot	2"	Prepacked 20/40 Sand	N/A

METHOD OF INSTALLATION

Lakewood used a Geoprobe 66DT drill rig to advance the boring to approximately 10 feet below grade surface (bgs). A 2-inch polyvinyl chloride (PVC) monitoring well was installed which consisted of 10 feet of 10 slot (0.010-inch) pre-packed well screen, and a solid 2" PVC riser. Well screen was installed from approximately 6 to 16 feet bgs with riser from grade surface to approximately 5 feet above grade surface.

WELL DEVELOPMENT DATA

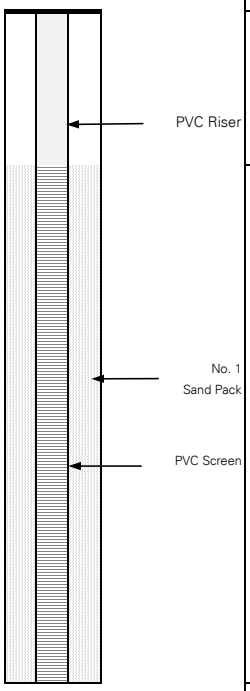
SURGE BLOCK DIAMETER	N/A	**TYPE PUMP**	Peristaltic Pump	**DEVELOPMENT CONFIRMATION**
DRILLER OR LANGAN	Driller	**MAX PUMP RATE**	0.25 gal/min	The well was purged until water was clear.
NUMBER OF SURGE CYCLES	N/A	**TOTAL VOLUME**	5 gallons	

TOP OF CASING	**ELEVATION**	**DEPTH (ft)**
	14	N/A
TOP OF SEAL	**ELEVATION**	**DEPTH (ft)**
	N/A	N/A
TOP OF FILTER	**ELEVATION**	**DEPTH (ft)**
	3.0	6.0
TOP OF SCREEN	**ELEVATION**	**DEPTH (ft)**
	3.0	6.0
BOTTOM OF BORING	**ELEVATION**	**DEPTH (ft)**
	-7.0	16.0
SCREEN LENGTH		
		10
SLOT SIZE		
		No. 10 Slot; 0.010 Inches

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
2.88	9/19/2025	6.12 ft

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
Top of PVC Riser	-5.0
Top of Filter/Screen	6.0
Bottom of Boring/Screen	16.0

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MONITORING WELL CONSTRUCTION AND DEVELOPMENT SUMMARY

Well No. **RMW07**

PROJECT		PROJECT NO.	
1709 Surf Avenue		170747001	
LOCATION		**ELEVATION AND DATUM**	
New York, NY		el. 6 NAVD88	
DRILLING AGENCY		**DATE STARTED**	**DATE FINISHED**
Lakewood Environmental Services Corp		9/12/2025	9/12/2025
DRILLING EQUIPMENT		**DRILLER**	
Geoprobe 66DT		Mike Kolasinski	
SIZE AND TYPE OF BIT		**INSPECTOR**	
3.75" Expendable Well Point		Aron Farber	
BOREHOLE DIAMETER		**TYPE OF WELL (OVERBURDEN / BEDROCK)**	
3.75 inches		Overburden	
RISER MATERIAL	**DIAMETER**	**TYPE OF BACKFILL MATERIAL**	
PVC	2"	Clean sand	
TYPE OF SCREEN	**DIAMETER**	**TYPE OF WELL PACK**	**TYPE OF SEAL MATERIAL**
PVC No. 10 Slot	2"	Prepacked 20/40 Sand	N/A

METHOD OF INSTALLATION

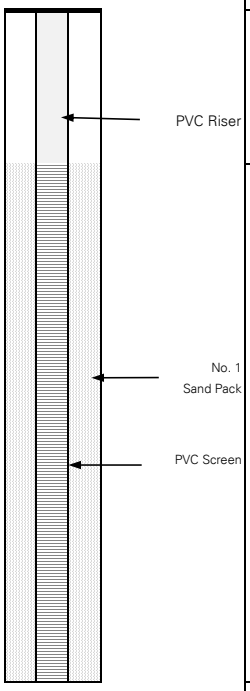
Lakewood used a Geoprobe 66DT drill rig to advance the boring to approximately 10 feet below grade surface (bgs). A 2-inch polyvinyl chloride (PVC) monitoring well was installed which consisted of 10 feet of 10 slot (0.010-inch) pre-packed well screen, and a solid 2" PVC riser. Well screen was installed from approximately 10 to 20 feet bgs with riser from grade surface to approximately 5 feet above grade surface.

WELL DEVELOPMENT DATA

SURGE BLOCK DIAMETER	N/A	**TYPE PUMP**	Peristaltic Pump	**DEVELOPMENT CONFIRMATION**
DRILLER OR LANGAN	Driller	**MAX PUMP RATE**	0.25 gal/min	The well was purged until water was clear.
NUMBER OF SURGE CYCLES	N/A	**TOTAL VOLUME**	5 gallons	

TOP OF CASING	**ELEVATION** 11	**DEPTH (ft)** N/A
TOP OF SEAL	**ELEVATION** N/A	**DEPTH (ft)** N/A
TOP OF FILTER	**ELEVATION** -4.0	**DEPTH (ft)** 10.0
TOP OF SCREEN	**ELEVATION** -4.0	**DEPTH (ft)** 10.0
BOTTOM OF BORING	**ELEVATION** -14.0	**DEPTH (ft)** 20.0
SCREEN LENGTH		10
SLOT SIZE		No. 10 Slot; 0.010 Inches

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
Top of PVC Riser	-5.0
Top of Filter/Screen	10.0
Bottom of Boring/Screen	20.0

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
-1.75	9/19/2025	7.75 ft

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MONITORING WELL CONSTRUCTION AND DEVELOPMENT SUMMARY

Well No. **RMW08**

PROJECT		PROJECT NO.	
1709 Surf Avenue		170747001	
LOCATION		**ELEVATION AND DATUM**	
New York, NY		el. 10 NAVD88	
DRILLING AGENCY		**DATE STARTED**	**DATE FINISHED**
Lakewood Environmental Services Corp		9/12/2025	9/12/2025
DRILLING EQUIPMENT		**DRILLER**	
Geoprobe 66DT		Mike Kolasinski	
SIZE AND TYPE OF BIT		**INSPECTOR**	
3.75" Expendable Well Point		Aron Farber	
BOREHOLE DIAMETER		**TYPE OF WELL (OVERBURDEN / BEDROCK)**	
3.75 inches		Overburden	
RISER MATERIAL	**DIAMETER**	**TYPE OF BACKFILL MATERIAL**	
PVC	2"	Clean sand	
TYPE OF SCREEN	**DIAMETER**	**TYPE OF WELL PACK**	**TYPE OF SEAL MATERIAL**
PVC No. 10 Slot	2"	Prepacked 20/40 Sand	N/A

METHOD OF INSTALLATION

Lakewood used a Geoprobe 66DT drill rig to advance the boring to approximately 10 feet below grade surface (bgs). A 2-inch polyvinyl chloride (PVC) monitoring well was installed which consisted of 10 feet of 10 slot (0.010-inch) pre-packed well screen, and a solid 2" PVC riser. Well screen was installed from approximately 0 to 10 feet bgs with riser from grade surface to approximately 5 feet above grade surface.

WELL DEVELOPMENT DATA

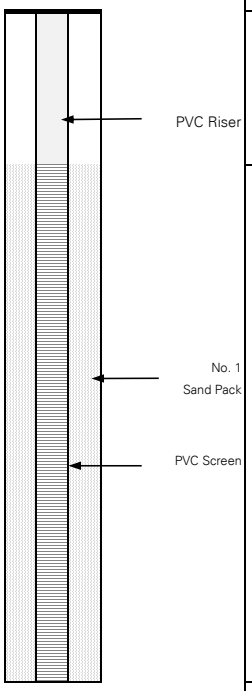
SURGE BLOCK DIAMETER	N/A	**TYPE PUMP**	Peristaltic Pump	**DEVELOPMENT CONFIRMATION**
DRILLER OR LANGAN	Driller	**MAX PUMP RATE**	0.25 gal/min	The well was purged until water was clear.
NUMBER OF SURGE CYCLES	N/A	**TOTAL VOLUME**	5 gallons	

TOP OF CASING	**ELEVATION**	**DEPTH (ft)**
	15	N/A
TOP OF SEAL	**ELEVATION**	**DEPTH (ft)**
	N/A	N/A
TOP OF FILTER	**ELEVATION**	**DEPTH (ft)**
	5.0	5.0
TOP OF SCREEN	**ELEVATION**	**DEPTH (ft)**
	5.0	5.0
BOTTOM OF BORING	**ELEVATION**	**DEPTH (ft)**
	-5.0	15.0
SCREEN LENGTH		
		10
SLOT SIZE		
		No. 10 Slot; 0.010 Inches

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
2.19	9/18/2025	7.81 ft

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
Top of PVC Riser	-5.0
Top of Filter/Screen	5.0
Bottom of Boring/Screen	15.0

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MONITORING WELL CONSTRUCTION AND DEVELOPMENT SUMMARY

Well No. **RMW09**

PROJECT		PROJECT NO.	
1709 Surf Avenue		170747001	
LOCATION		**ELEVATION AND DATUM**	
New York, NY		el. 10 NAVD88	
DRILLING AGENCY		**DATE STARTED**	**DATE FINISHED**
Lakewood Environmental Services Corp		9/12/2025	9/12/2025
DRILLING EQUIPMENT		**DRILLER**	
Geoprobe 66DT		Mike Kolasinski	
SIZE AND TYPE OF BIT		**INSPECTOR**	
3.75" Expendable Well Point		Aron Farber	
BOREHOLE DIAMETER		**TYPE OF WELL (OVERBURDEN / BEDROCK)**	
3.75 inches		Overburden	
RISER MATERIAL	**DIAMETER**	**TYPE OF BACKFILL MATERIAL**	
PVC	2"	Clean sand	
TYPE OF SCREEN	**DIAMETER**	**TYPE OF WELL PACK**	**TYPE OF SEAL MATERIAL**
PVC No. 10 Slot	2"	Prepacked 20/40 Sand	N/A

METHOD OF INSTALLATION

Lakewood used a Geoprobe 66DT drill rig to advance the boring to approximately 10 feet below grade surface (bgs). A 2-inch polyvinyl chloride (PVC) monitoring well was installed which consisted of 10 feet of 10 slot (0.010-inch) pre-packed well screen, and a solid 2" PVC riser. Well screen was installed from approximately 0 to 10 feet bgs with riser from grade surface to approximately 3 feet above grade surface.

WELL DEVELOPMENT DATA

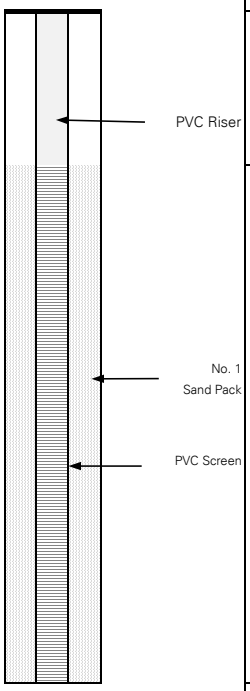
SURGE BLOCK DIAMETER	N/A	**TYPE PUMP**	Peristaltic Pump	**DEVELOPMENT CONFIRMATION**
DRILLER OR LANGAN	Driller	**MAX PUMP RATE**	0.25 gal/min	The well was purged until water was clear.
NUMBER OF SURGE CYCLES	N/A	**TOTAL VOLUME**	5 gallons	

TOP OF CASING	**ELEVATION** 13	**DEPTH (ft)** N/A
TOP OF SEAL	**ELEVATION** N/A	**DEPTH (ft)** N/A
TOP OF FILTER	**ELEVATION** 5.0	**DEPTH (ft)** 5.0
TOP OF SCREEN	**ELEVATION** 5.0	**DEPTH (ft)** 5.0
BOTTOM OF BORING	**ELEVATION** -5.0	**DEPTH (ft)** 15.0
SCREEN LENGTH		10
SLOT SIZE		No. 10 Slot; 0.010 Inches

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
4.26	9/19/2025	5.74 ft

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
Top of PVC Riser	-3.0
Top of Filter/Screen	5.0
Bottom of Boring/Screen	15.0

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MONITORING WELL CONSTRUCTION AND DEVELOPMENT SUMMARY

Well No. **RMW10**

PROJECT		PROJECT NO.	
1709 Surf Avenue		170747001	
LOCATION		**ELEVATION AND DATUM**	
New York, NY		el. 5 NAVD88	
DRILLING AGENCY		**DATE STARTED**	**DATE FINISHED**
Lakewood Environmental Services Corp		9/12/2025	9/12/2025
DRILLING EQUIPMENT		**DRILLER**	
Geoprobe 66DT		Mike Kolasinski	
SIZE AND TYPE OF BIT		**INSPECTOR**	
3.75" Expendable Well Point		Aron Farber	
BOREHOLE DIAMETER		**TYPE OF WELL (OVERBURDEN / BEDROCK)**	
3.75 inches		Overburden	
RISER MATERIAL	**DIAMETER**	**TYPE OF BACKFILL MATERIAL**	
PVC	2"	Clean sand	
TYPE OF SCREEN	**DIAMETER**	**TYPE OF WELL PACK**	**TYPE OF SEAL MATERIAL**
PVC No. 10 Slot	2"	Prepacked 20/40 Sand	N/A

METHOD OF INSTALLATION

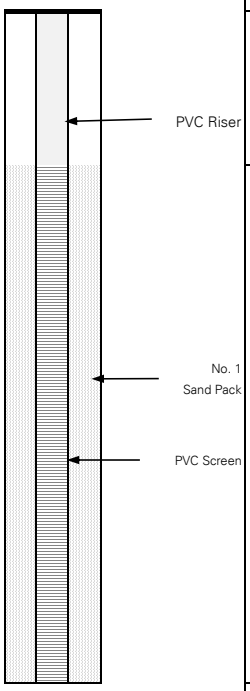
Lakewood used a Geoprobe 66DT drill rig to advance the boring to approximately 10 feet below grade surface (bgs). A 2-inch polyvinyl chloride (PVC) monitoring well was installed which consisted of 10 feet of 10 slot (0.010-inch) pre-packed well screen, and a solid 2" PVC riser. Well screen was installed from approximately 0 to 10 feet bgs with riser from grade surface to approximately 5 feet above grade surface.

WELL DEVELOPMENT DATA

SURGE BLOCK DIAMETER	N/A	**TYPE PUMP**	Peristaltic Pump	**DEVELOPMENT CONFIRMATION**
DRILLER OR LANGAN	Driller	**MAX PUMP RATE**	0.25 gal/min	The well was purged until water was clear.
NUMBER OF SURGE CYCLES	N/A	**TOTAL VOLUME**	5 gallons	

TOP OF CASING **ELEVATION** 10	**DEPTH (ft)** N/A	
TOP OF SEAL **ELEVATION** N/A	**DEPTH (ft)** N/A	
TOP OF FILTER **ELEVATION** 2.0	**DEPTH (ft)** 3.0	
TOP OF SCREEN **ELEVATION** 2.0	**DEPTH (ft)** 3.0	
BOTTOM OF BORING **ELEVATION** -8.0	**DEPTH (ft)** 13.0	
SCREEN LENGTH	10	
SLOT SIZE	No. 10 Slot; 0.010 Inches	

WELL DETAILS



SUMMARY SOIL CLASSIFICATION	DEPTH (FT)
Top of PVC Riser	-5.0
Top of Filter/Screen	3.0
Bottom of Boring/Screen	13.0

GROUNDWATER ELEVATIONS

ELEVATION	DATE	DEPTH TO WATER
-1.5	9/19/2025	6.5 ft

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Project Information		Well Information		Equipment Information		Sampling Conditions		Sampling Information	
Project Name:	1709 Surf Avenue	**Well No:**	RMW01	**Water Quality Device Model:**	Horiba U-52 Water Quality Meter	**Weather:**	Sunny, 71ºF		RMW01_091825
Project Number:	170747001	**Well Depth:**	10.00	**Pine Number:**	213188	**Background PID (ppm):**	0.0	**Sample(s):**	DUP01_091825
Site Location:	Brooklyn, NY	**Well Diameter:**	2 inch	**Pump Make and Model:**	Geopump Series 1 Drive Peristatic pump	**PID Beneath Inner Cap (ppm):**	0.0		
Sampling	Kiki Wallick	**Well Screen**	0.00	**Pine Number:**	040186	**Pump Intake Depth:**	5.03	**Sample Date:**	9/18/2025
Personnel:		**Interval:**	10.00	**Tubing Diameter:**	0.25" x 0.375"	**Depth to Water Before Purge:**	1.06	**Sample Time:**	10:48

STABILIZATION = 3 successive readings within limits

MILLITARY TIME	TEMP °Celsius (+/- 3%)	PH (+/- 0.1)	ORP mV (+/- 10mV)	CONDUCTIVITY mS/cm (+/- 3%)	TURBIDITY NTU (+/- 10% when above 5 NTU)	DO mg/L (+/- 10% when above 0.5 mg/L)	DTW ft Drawdown < 0.33 ft	Flow Rate (L/min) (<0.5 L/min)	Cumulative Discharge Volume (Liters)	NOTES color, odor etc.	Stabilized?
BEGIN PURGING											
9:46	21.89	6.95	82	0.354	45	0.55	1.06			Clear purge water	**N/A**
9:51	21.36	7.11	60	0.334	44	0.39	1.12				**N/A**
9:56	21.32	7.20	44	0.308	46	0.25	1.12				**N**
10:01	21.32	7.25	21	0.295	48	0.18	1.12				**N**
10:06	21.30	7.26	9	0.288	42	0.22	1.12	0.20	1.00		**N**
10:11	21.26	7.28	0	0.276	39	0.18	1.12	0.20			**N**
10:16	21.29	7.29	-4	0.268	35	0.15	1.12				**N**
10:21	21.22	7.31	-11	0.257	28	0.11	1.12				**N**
10:26	21.28	7.33	-17	0.247	23	0.14	1.12	0.40	2.00		**N**
10:31	21.21	7.34	-22	0.239	20	0.15	1.12				**N**
10:36	21.28	7.35	-39	0.231	17	0.15	1.12				**N**
10:41	21.33	7.35	-39	0.229	16	0.16	1.12				**N**

Notes:

1. Well depths and groundwater depths were measured in feet below the top of well casing, northern most point.
2. Well and tubing diameters are measured in inches.
3. PID = Photoionization Detector
4. PPM = Parts per million
5. pH = Hydrogen ion concentration
6. ORP = Oxidation-reduction potential, measured in millivolts (mV)
7. DO = Dissolved Oxygen, measured in milligrams per liter (mg/L)
8. DTW = Depth to water
9. mS/cm = milli-Siemens per centimeter
10. NTU = Nephelometric Turbidity Unit
11. mg/L = milligrams per liter
12. L/min = liters per minute

Calculated Flow Rate		
Volume (L)	**Time (m:s)**	**Flow Rate (L/min)**
0.148	52:00.0	0.171
0.148	40:00.0	0.222

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Project Information		Well Information		Equipment Information		Sampling Conditions		Sampling Information	
Project Name:	1709 Surf Avenue	**Well No:**	RMW02	**Water Quality Device Model:**	Horiba U-52 Water Quality Meter	**Weather:**	Sunny, 76ºF		RMW02_091825
Project Number:	170747001	**Well Depth:**	10.00	**Pine Number:**	213188	**Background PID (ppm):**	0.1	**Sample(s):**	
Site Location:	Brooklyn, NY	**Well Diameter:**	2 inch	**Pump Make and Model:**	Geopump Series 1 Drive Peristatic pump	**PID Beneath Inner Cap (ppm):**	0.0		
Sampling	Kiki Wallick	**Well Screen**	0.00	**Pine Number:**	040186	**Pump Intake Depth:**	4.23	**Sample Date:**	9/18/2025
Personnel:		**Interval:**	10.00	**Tubing Diameter:**	0.170" x 0.250"	**Depth to Water Before Purge:**	1.47	**Sample Time:**	13:25

STABILIZATION = 3 successive readings within limits

MILLITARY TIME	TEMP °Celsius (+/- 3%)	PH (+/- 0.1)	ORP mV (+/- 10mV)	CONDUCTIVITY mS/cm (+/- 3%)	TURBIDITY NTU (+/- 10% when above 5 NTU)	DO mg/L (+/- 10% when above 0.5 mg/L)	DTW ft Drawdown < 0.33 ft	Flow Rate (L/min) (<0.5 L/min)	Cumulative Discharge Volume (Liters)	NOTES color, odor etc.	Stabilized?
BEGIN PURGING											
13:00	20.82	7.39	-80	0.839	33	0.95			1.00	Clear purge water	**N/A**
13:05	20.18	7.41	-102	0.861	12	0.22	1.50	0.20	2.00		**N/A**
13:10	19.89	7.40	-114	0.887	8	0.21	1.50	0.30	3.50		**N**
13:15	19.82	7.39	-122	0.901	8	0.15	1.50	0.30	5.00		**N**
13:20	20.21	7.38	-123	0.908	8	0.07	1.50	0.40	7.00		**Y**

Notes:

1. Well depths and groundwater depths were measured in feet below the top of well casing, northern most point.
2. Well and tubing diameters are measured in inches.
3. PID = Photoionization Detector
4. PPM = Parts per million
5. pH = Hydrogen ion concentration
6. ORP = Oxidation-reduction potential, measured in millivolts (mV)
7. DO = Dissolved Oxygen, measured in milligrams per liter (mg/L)
8. DTW = Depth to water
9. mS/cm = milli-Siemens per centimeter
10. NTU = Nephelometric Turbidity Unit
11. mg/L = milligrams per liter
12. L/min = liters per minute

Calculated Flow Rate		
Volume (L)	**Time (m:s)**	**Flow Rate (L/min)**
0.148	31:00.0	0.286

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Project Information		Well Information		Equipment Information		Sampling Conditions		Sampling Information	
Project Name:	1709 Surf Avenue	**Well No:**	RMW03	**Water Quality Device Model:**	Horiba U-52 Water Quality Meter	**Weather:**	Sunny, 73ºF		RMW03_091825
Project Number:	170747001	**Well Depth:**	10.00	**Pine Number:**	213188	**Background PID (ppm):**	0.0	**Sample(s):**	
Site Location:	Brooklyn, NY	**Well Diameter:**	2 inch	**Pump Make and Model:**	Geopump Series 1 Drive Peristatic pump	**PID Beneath Inner Cap (ppm):**	0.0		
Sampling Personnel:	Kiki Wallick	**Well Screen Interval:**	0.00 10.00	**Pine Number:**	040186	**Pump Intake Depth:**	4.25	**Sample Date:**	9/18/2025
				Tubing Diameter:	0.170" x 0.250"	**Depth to Water Before Purge:**	1.50	**Sample Time:**	12:20

STABILIZATION = 3 successive readings within limits

MILLITARY TIME	TEMP °Celsius (+/- 3%)	PH (+/- 0.1)	ORP mV (+/- 10mV)	CONDUCTIVITY mS/cm (+/- 3%)	TURBIDITY NTU (+/- 10% when above 5 NTU)	DO mg/L (+/- 10% when above 0.5 mg/L)	DTW ft Drawdown < 0.33 ft	Flow Rate (L/min) (<0.5 L/min)	Cumulative Discharge Volume (Liters)	NOTES color, odor etc.	Stabilized?
BEGIN PURGING											
11:33	21.93	7.42	-68	1.040	39	1.07	1.55		0.50	Clear purge water	**N/A**
11:38	21.40	7.43	-189	1.040	33	0.45	1.55	0.20	1.50		**N/A**
11:43	20.97	7.38	-390	1.040	19	0.23	1.55	0.10	2.00		**N**
11:48	20.74	7.24	-342	1.310	13	0.08	1.55	0.20	3.00		**N**
11:53	21.04	7.23	-312	1.330	13	0.06	1.55	0.20	4.00		**N**
11:58	21.10	7.23	-290	1.370	12	0.05	1.55	0.20	5.00		**N**
12:03	21.22	7.23	-257	1.380	11	0.03	1.55	0.20	6.00		**N**
12:08	21.06	7.24	-258	1.390	11	0.02	1.55	0.20	7.00		**N**
12:13	20.96	7.24	-250	1.390	10	0.01	1.55	0.20	8.00		**N**
12:18	20.95	7.24	-248	1.390	10	0.00	1.55	0.20	9.00		**Y**

Notes:

1. Well depths and groundwater depths were measured in feet below the top of well casing, northern most point.
2. Well and tubing diameters are measured in inches.
3. PID = Photoionization Detector
4. PPM = Parts per million
5. pH = Hydrogen ion concentration
6. ORP = Oxidation-reduction potential, measured in millivolts (mV)
7. DO = Dissolved Oxygen, measured in milligrams per liter (mg/L)
8. DTW = Depth to water
9. mS/cm = milli-Siemens per centimeter
10. NTU = Nephelometric Turbidity Unit
11. mg/L = milligrams per liter
12. L/min = liters per minute

Calculated Flow Rate		
Volume (L)	**Time (m:s)**	**Flow Rate (L/min)**
0.148	45:00.0	0.197
0.148	46:00.0	0.193

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Project Information		Well Information		Equipment Information		Sampling Conditions		Sampling Information	
Project Name:	1709 Surf Avenue	**Well No:**	RMW04	**Water Quality Device Model:**	Horiba U-52 Water Quality Meter	**Weather:**	Sunny, 69ºF	**Sample(s):**	RMW04_091925
Project Number:	170747001	**Well Depth:**	15.00	**Pine Number:**	213188	**Background PID (ppm):**	0.0		
Site Location:	Brooklyn, NY	**Well Diameter:**	2 inch	**Pump Make and Model:**	Geopump Series 1 Drive Peristatic pump	**PID Beneath Inner Cap (ppm):**	0.0		
Sampling	Kiki Wallick	**Well Screen**	5.00	**Pine Number:**	040186	**Pump Intake Depth:**	10.56	**Sample Date:**	9/19/2025
Personnel:		**Interval:**	15.00	**Tubing Diameter:**	0.170" x 0.250"	**Depth to Water Before Purge:**	6.12	**Sample Time:**	8:55

STABILIZATION = 3 successive readings within limits

MILLITARY TIME	TEMP °Celsius (+/- 3%)	PH (+/- 0.1)	ORP mV (+/- 10mV)	CONDUCTIVITY mS/cm (+/- 3%)	TURBIDITY NTU (+/- 10% when above 5 NTU)	DO mg/L (+/- 10% when above 0.5 mg/L)	DTW ft Drawdown < 0.33 ft	Flow Rate (L/min) (<0.5 L/min)	Cumulative Discharge Volume (Liters)	NOTES color, odor etc.	Stabilized?
BEGIN PURGING											
8:08	22.87	10.57	-249	2.940	64	6.91	6.39		0.25	Clear purge water	**N/A**
8:13	23.20	9.97	-307	2.950	147	6.92	6.40	0.25	1.50		**N/A**
8:18	23.34	9.68	-312	3.010	355	6.77	6.40	0.15	2.25		**N**
8:23	23.43	9.54	-314	3.090	239	6.67	6.50	0.15	3.00		**N**
8:28	23.55	9.36	-307	3.190	177	6.52	6.40	0.20	4.00		**N**
8:33	23.75	9.08	-294	3.320	17	6.39	6.40	0.20	5.00		**N**
8:38	23.75	9.07	-293	3.320	23	6.21	6.50	0.20	6.00		**N**
8:43	23.81	9.00	-285	3.350	28	5.94	6.50	0.20	7.00	Cloudy purge water, max. PID 0.0 ppm	**N**
8:48	23.85	8.96	-280	3.390	27	5.83	6.50	0.20	8.00		**N**
8:53	23.89	8.91	-275	3.420	26	5.73	6.50	0.20	9.00		**Y**

Notes:

1. Well depths and groundwater depths were measured in feet below the top of well casing, northern most point.
2. Well and tubing diameters are measured in inches.
3. PID = Photoionization Detector
4. PPM = Parts per million
5. pH = Hydrogen ion concentration
6. ORP = Oxidation-reduction potential, measured in millivolts (mV)
7. DO = Dissolved Oxygen, measured in milligrams per liter (mg/L)
8. DTW = Depth to water
9. mS/cm = milli-Siemens per centimeter
10. NTU = Nephelometric Turbidity Unit
11. mg/L = milligrams per liter
12. L/min = liters per minute

Calculated Flow Rate		
Volume (L)	**Time (m:s)**	**Flow Rate (L/min)**
0.148	49:00.0	0.181

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Project Information		Well Information		Equipment Information		Sampling Conditions		Sampling Information	
Project Name:	1709 Surf Avenue	**Well No:**	RMW05	**Water Quality Device Model:**	Horiba U-52 Water Quality Meter	**Weather:**	Sunny, 78ºF	**Sample(s):**	RMW05_091825
Project Number:	170747001	**Well Depth:**	13.00	**Pine Number:**	213188	**Background PID (ppm):**	0.0		
Site Location:	Brooklyn, NY	**Well Diameter:**	2 inch	**Pump Make and Model:**	Geopump Series 1 Drive Peristatic pump	**PID Beneath Inner Cap (ppm):**	0.0		
Sampling Personnel:	Kiki Wallick	**Well Screen Interval:**	3.00 – 13.00	**Pine Number:**	040186	**Pump Intake Depth:**	6.95	**Sample Date:**	9/18/2025
				Tubing Diameter:	0.170" x 0.250"	**Depth to Water Before Purge:**	4.89	**Sample Time:**	14:52

STABILIZATION = 3 successive readings within limits

MILLITARY TIME	TEMP °Celsius (+/- 3%)	PH (+/- 0.1)	ORP mV (+/- 10mV)	CONDUCTIVITY mS/cm (+/- 3%)	TURBIDITY NTU (+/- 10% when above 5 NTU)	DO mg/L (+/- 10% when above 0.5 mg/L)	DTW ft Drawdown < 0.33 ft	Flow Rate (L/min) (<0.5 L/min)	Cumulative Discharge Volume (Liters)	NOTES color, odor etc.	Stabilized?
BEGIN PURGING											
13:53	21.56	7.39	-342	0.647	40	1.88	5.00				**N/A**
13:58	21.23	7.41	-392	0.636	36	0.35	5.10	0.10	0.50		**N/A**
14:03	21.05	7.37	-372	0.634	32	0.15	5.00	0.20	1.50		**N**
14:08	20.95	7.33	-370	0.632	29	0.08	5.00	0.10	2.00		**N**
14:13	20.90	7.29	-378	0.628	22	0.07	5.00	0.20	3.00		**N**
14:18	21.05	7.25	-368	0.625	19	0.07	5.00	0.20	4.00		**N**
14:23	21.05	7.24	-358	0.623	18	0.05	5.10	0.10	4.50		**N**
14:28	21.08	7.17	-343	0.621	13	0.05	5.00	0.10	5.00		**N**
14:33	21.12	7.20	-338	0.620	12	0.05	5.00	0.10	5.50		**N**
14:38	21.39	7.19	-315	0.619	10	0.00	5.00	0.10	6.00		**N**
14:43	21.40	7.18	-316	0.619	10	0.00	5.00	0.10	6.50		**N**
14:48	21.38	7.18	-308	0.620	10	0.00	5.00	0.10	7.00		**Y**

Notes:

1. Well depths and groundwater depths were measured in feet below the top of well casing, northern most point.
2. Well and tubing diameters are measured in inches.
3. PID = Photoionization Detector
4. PPM = Parts per million
5. pH = Hydrogen ion concentration
6. ORP = Oxidation-reduction potential, measured in millivolts (mV)
7. DO = Dissolved Oxygen, measured in milligrams per liter (mg/L)
8. DTW = Depth to water
9. mS/cm = milli-Siemens per centimeter
10. NTU = Nephelometric Turbidity Unit
11. mg/L = milligrams per liter
12. L/min = liters per minute

Calculated Flow Rate		
Volume (L)	**Time (m:s)**	**Flow Rate (L/min)**
0.148	38:00.0	0.234

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Project Information		Well Information		Equipment Information		Sampling Conditions		Sampling Information	
Project Name:	1709 Surf Avenue	**Well No:**	RMW06	**Water Quality Device Model:**	Horiba U-52 Water Quality Meter	**Weather:**	Sunny, 74ºF		RMW06_091925
Project Number:	170747001	**Well Depth:**	15.00	**Pine Number:**	213188	**Background PID (ppm):**	0.0	**Sample(s):**	
Site Location:	Brooklyn, NY	**Well Diameter:**	2 inch	**Pump Make and Model:**	Geopump Series 1 Drive Peristatic pump	**PID Beneath Inner Cap (ppm):**	0.0		
Sampling	Kiki Wallick	**Well Screen**	5.00	**Pine Number:**	040186	**Pump Intake Depth:**	10.56	**Sample Date:**	9/19/2025
Personnel:		**Interval:**	15.00	**Tubing Diameter:**	0.170" x 0.250"	**Depth to Water Before Purge:**	6.12	**Sample Time:**	10:40

STABILIZATION = 3 successive readings within limits

MILLITARY TIME	TEMP °Celsius (+/- 3%)	PH (+/- 0.1)	ORP mV (+/- 10mV)	CONDUCTIVITY mS/cm (+/- 3%)	TURBIDITY NTU (+/- 10% when above 5 NTU)	DO mg/L (+/- 10% when above 0.5 mg/L)	DTW ft Drawdown < 0.33 ft	Flow Rate (L/min) (<0.5 L/min)	Cumulative Discharge Volume (Liters)	NOTES color, odor etc.	Stabilized?
BEGIN PURGING											
9:40	25.43	7.75	-83	10.700	46	0.65			0.25	Clear purge water	**N/A**
9:45	24.50	7.69	-103	10.800	49	0.32	6.45	0.30	1.75		**N/A**
9:50	24.20	7.66	-117	10.300	46	0.17	6.45	0.20	2.75		**N**
9:55	24.19	7.60	-134	9.790	34	0.09	6.45	0.25	4.00		**N**
10:00	24.38	7.54	-141	9.290	32	0.07	6.44	0.20	5.00		**N**
10:05	24.38	7.53	-142	9.250	31	0.07	6.45	0.20	6.00		**N**
10:10	24.39	7.48	-147	8.860	24	0.42	6.40	0.20	7.00		**N**
10:15	24.42	7.46	-148	8.740	25	0.09	6.45	0.15	7.75		**N**
10:20	24.46	7.44	-150	8.580	24	0.01	6.45	0.25	9.00		**N**
10:25	24.49	7.39	-153	8.250	15	0.00	6.45	0.20	10.00		**N**
10:30	24.53	7.39	-154	8.200	16	0.00	6.45	0.20	11.00		**N**
10:35	24.56	7.38	-154	8.060	15	0.00	6.45	0.20	12.00		**Y**

Notes:

1. Well depths and groundwater depths were measured in feet below the top of well casing, northern most point.
2. Well and tubing diameters are measured in inches.
3. PID = Photoionization Detector
4. PPM = Parts per million
5. pH = Hydrogen ion concentration
6. ORP = Oxidation-reduction potential, measured in millivolts (mV)
7. DO = Dissolved Oxygen, measured in milligrams per liter (mg/L)
8. DTW = Depth to water
9. mS/cm = milli-Siemens per centimeter
10. NTU = Nephelometric Turbidity Unit
11. mg/L = milligrams per liter
12. L/min = liters per minute

Calculated Flow Rate		
Volume (L)	**Time (m:s)**	**Flow Rate (L/min)**
0.148	35:00.0	0.254

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Project Information		Well Information		Equipment Information		Sampling Conditions		Sampling Information	
Project Name:	1709 Surf Avenue	**Well No:**	RMW07	**Water Quality Device Model:**	Horiba U-52 Water Quality Meter	**Weather:**	Sunny, 80ºF		RMW07_091925
Project Number:	170747001	**Well Depth:**	13.00	**Pine Number:**	213188	**Background PID (ppm):**	0.0	**Sample(s):**	
Site Location:	Brooklyn, NY	**Well Diameter:**	2 inch	**Pump Make and Model:**	Geopump Series 1 Drive Peristatic pump	**PID Beneath Inner Cap (ppm):**	0.0		
Sampling	Kiki Wallick	**Well Screen**	3.00	**Pine Number:**	040186	**Pump Intake Depth:**	10.38	**Sample Date:**	9/19/2025
Personnel:		**Interval:**	13.00	**Tubing Diameter:**	0.170" x 0.250"	**Depth to Water Before Purge:**	7.75	**Sample Time:**	13:50

STABILIZATION = 3 successive readings within limits

MILLITARY TIME	TEMP °Celsius (+/- 3%)	PH (+/- 0.1)	ORP mV (+/- 10mV)	CONDUCTIVITY mS/cm (+/- 3%)	TURBIDITY NTU (+/- 10% when above 5 NTU)	DO mg/L (+/- 10% when above 0.5 mg/L)	DTW ft Drawdown < 0.33 ft	Flow Rate (L/min) (<0.5 L/min)	Cumulative Discharge Volume (Liters)	NOTES color, odor etc.	Stabilized?
BEGIN PURGING											
0:50	24.79	7.55	-95	13.000	79	0.40			0.50		**N/A**
0:55	24.49	7.53	-106	12.800	79	0.22	7.94	0.35	2.25		**N/A**
1:00	24.20	7.50	-114	11.500	65	0.09	7.94	0.30	3.75		**N**
1:05	24.15	7.49	-115	11.200	61	0.07	7.90	0.20	4.75		**N**
1:10	24.05	7.46	-116	10.400	43	0.04	7.94	0.25	6.00		**N**
1:15	24.01	7.44	-117	9.860	32	0.04	7.92	0.20	7.00		**N**
1:20	23.97	7.42	-118	9.380	24	0.13	7.94	0.20	8.00		**N**
1:25	23.98	7.40	-118	9.100	23	0.02	7.90	0.20	9.00		**N**
1:30	23.90	7.38	-118	8.720	20	0.00	7.94	0.20	10.00		**N**
1:35	23.92	7.37	-119	8.400	12	0.00	7.94	0.20	11.00		**N**
1:40	23.96	7.36	-119	8.260	11	0.00	7.94	0.20	12.00		**N**
1:45	23.98	7.36	-119	8.160	11	0.00	7.94	0.20	13.00		**Y**

Notes:

1. Well depths and groundwater depths were measured in feet below the top of well casing, northern most point.
2. Well and tubing diameters are measured in inches.
3. PID = Photoionization Detector
4. PPM = Parts per million
5. pH = Hydrogen ion concentration
6. ORP = Oxidation-reduction potential, measured in millivolts (mV)
7. DO = Dissolved Oxygen, measured in milligrams per liter (mg/L)
8. DTW = Depth to water
9. mS/cm = milli-Siemens per centimeter
10. NTU = Nephelometric Turbidity Unit
11. mg/L = milligrams per liter
12. L/min = liters per minute

Calculated Flow Rate		
Volume (L)	**Time (m:s)**	**Flow Rate (L/min)**
0.148	28:00.0	0.317
0.148	45:00.0	0.197

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Project Information		Well Information		Equipment Information		Sampling Conditions		Sampling Information	
Project Name:	1709 Surf Avenue	**Well No:**	RMW08	**Water Quality Device Model:**	Horiba U-52 Water Quality Meter	**Weather:**	Sunny, 77ºF		RMW08_091825
Project Number:	170747001	**Well Depth:**	15.00	**Pine Number:**	213188	**Background PID (ppm):**	0.0	**Sample(s):**	
Site Location:	Brooklyn, NY	**Well Diameter:**	2 inch	**Pump Make and Model:**	Geopump Series 1 Drive Peristatic pump	**PID Beneath Inner Cap (ppm):**	0.0		
Sampling	Kiki Wallick	**Well Screen**	5.00	**Pine Number:**	040186	**Pump Intake Depth:**	11.45	**Sample Date:**	9/18/2025
Personnel:		**Interval:**	15.00	**Tubing Diameter:**	0.170" x 0.250"	**Depth to Water Before Purge:**	7.81	**Sample Time:**	16:28

STABILIZATION = 3 successive readings within limits

MILLITARY TIME	TEMP °Celsius (+/- 3%)	PH (+/- 0.1)	ORP mV (+/- 10mV)	CONDUCTIVITY mS/cm (+/- 3%)	TURBIDITY NTU (+/- 10% when above 5 NTU)	DO mg/L (+/- 10% when above 0.5 mg/L)	DTW ft Drawdown < 0.33 ft	Flow Rate (L/min) (<0.5 L/min)	Cumulative Discharge Volume (Liters)	NOTES color, odor etc.	Stabilized?
BEGIN PURGING											
15:46	26.05	8.38	64	10.300	465	1.76	7.85			Clear purge water	**N/A**
15:51	25.66	8.31	-34	10.500	461	0.60	7.80	0.25	1.25		**N/A**
15:56	25.47	8.19	-131	9.900	437	0.33	7.80	0.15	2.00		**N**
16:01	25.36	8.14	-150	9.410	402	0.21	7.85	0.10	2.50		**N**
16:06	25.24	8.01	-153	8.930	311	0.08	7.80	0.10	3.00		**N**
16:11	25.21	7.98	-153	8.870	306	0.09	7.85	0.20	4.00		**N**
16:16	25.13	7.81	-147	8.420	229	0.02	7.85	0.10	4.50		**N**
16:21	25.11	7.75	-146	8.270	208	0.00	7.85	0.10	5.00		**N**
16:26	25.12	7.73	-146	8.220	211	0.00	7.85		6.00		**Y**

Notes:

1. Well depths and groundwater depths were measured in feet below the top of well casing, northern most point.
2. Well and tubing diameters are measured in inches.
3. PID = Photoionization Detector
4. PPM = Parts per million
5. pH = Hydrogen ion concentration
6. ORP = Oxidation-reduction potential, measured in millivolts (mV)
7. DO = Dissolved Oxygen, measured in milligrams per liter (mg/L)
8. DTW = Depth to water
9. mS/cm = milli-Siemens per centimeter
10. NTU = Nephelometric Turbidity Unit
11. mg/L = milligrams per liter
12. L/min = liters per minute

Calculated Flow Rate		
Volume (L)	**Time (m:s)**	**Flow Rate (L/min)**
0.148	42:00.0	0.211

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Project Information		Well Information		Equipment Information		Sampling Conditions		Sampling Information	
Project Name:	1709 Surf Avenue	**Well No:**	RMW09	**Water Quality Device Model:**	Horiba U-52 Water Quality Meter	**Weather:**	Sunny, 78ºF		RMW09_091925
Project Number:	170747001	**Well Depth:**	15.00	**Pine Number:**	213188	**Background PID (ppm):**	0.0	**Sample(s):**	
Site Location:	Brooklyn, NY	**Well Diameter:**	2 inch	**Pump Make and Model:**	Geopump Series 1 Drive Peristatic pump	**PID Beneath Inner Cap (ppm):**	0.1		
Sampling	Kiki Wallick	**Well Screen**	5.00	**Pine Number:**	040186	**Pump Intake Depth:**	10.37	**Sample Date:**	9/19/2025
Personnel:		**Interval:**	15.00	**Tubing Diameter:**	0.170" x 0.250"	**Depth to Water Before Purge:**	5.74	**Sample Time:**	12:20

STABILIZATION = 3 successive readings within limits

MILLITARY TIME	TEMP °Celsius (+/- 3%)	PH (+/- 0.1)	ORP mV (+/- 10mV)	CONDUCTIVITY mS/cm (+/- 3%)	TURBIDITY NTU (+/- 10% when above 5 NTU)	DO mg/L (+/- 10% when above 0.5 mg/L)	DTW ft Drawdown < 0.33 ft	Flow Rate (L/min) (<0.5 L/min)	Cumulative Discharge Volume (Liters)	NOTES color, odor etc.	Stabilized?
BEGIN PURGING											
11:30	27.57	8.13	59	64.500	66	0.52				Clear purge water	**N/A**
11:35	26.06	8.05	-2	51.100	51	0.20	5.95	0.25	1.25		**N/A**
11:40	25.60	7.91	-46	4.970	53	0.16	5.95	0.15	2.00		**N**
11:45	25.61	7.88	-49	4.930	55	0.15	5.95	0.10	2.50		**N**
11:50	25.41	7.68	-45	4.720	53	0.16	5.95	0.20	3.50		**N**
11:55	25.31	7.53	-40	4.550	39	0.13	5.95	0.30	5.00		**N**
12:00	25.24	7.48	-40	4.440	30	0.18	5.94	0.20	6.00		**N**
12:05	25.24	7.40	-45	4.280	16	0.08	5.94	0.20	7.00		**N**
12:10	25.26	7.40	-45	4.270	16	0.08	5.94	0.20	8.00		**N**
12:15	25.27	7.39	-46	4.270	17	0.09	5.94	0.20	9.00		**Y**

Notes:

1. Well depths and groundwater depths were measured in feet below the top of well casing, northern most point.
2. Well and tubing diameters are measured in inches.
3. PID = Photoionization Detector
4. PPM = Parts per million
5. pH = Hydrogen ion concentration
6. ORP = Oxidation-reduction potential, measured in millivolts (mV)
7. DO = Dissolved Oxygen, measured in milligrams per liter (mg/L)
8. DTW = Depth to water
9. mS/cm = milli-Siemens per centimeter
10. NTU = Nephelometric Turbidity Unit
11. mg/L = milligrams per liter
12. L/min = liters per minute

Calculated Flow Rate		
Volume (L)	**Time (m:s)**	**Flow Rate (L/min)**
0.148	46:00.0	0.193

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Project Information		Well Information		Equipment Information		Sampling Conditions		Sampling Information	
Project Name:	1709 Surf Avenue	**Well No:**	RMW10	**Water Quality Device Model:**	Horiba U-52 Water Quality Meter	**Weather:**	Sunny, 82ºF		RMW10_091925
Project Number:	170747001	**Well Depth:**	13.00	**Pine Number:**	213188	**Background PID (ppm):**	0.0	**Sample(s):**	
Site Location:	Brooklyn, NY	**Well Diameter:**	2 inch	**Pump Make and Model:**	Geopump Series 1 Drive Peristatic pump	**PID Beneath Inner Cap (ppm):**	0.0		
Sampling Personnel:	Kiki Wallick	**Well Screen Interval:**	3.00 13.00	**Pine Number:**	040186	**Pump Intake Depth:**	9.75	**Sample Date:**	9/19/2025
				Tubing Diameter:	0.170" x 0.250"	**Depth to Water Before Purge:**	6.50	**Sample Time:**	15:25

STABILIZATION = 3 successive readings within limits

MILLITARY TIME	TEMP ºCelsius (+/- 3%)	PH (+/- 0.1)	ORP mV (+/- 10mV)	CONDUCTIVITY mS/cm (+/- 3%)	TURBIDITY NTU (+/- 10% when above 5 NTU)	DO mg/L (+/- 10% when above 0.5 mg/L)	DTW ft Drawdown < 0.33 ft	Flow Rate (L/min) (<0.5 L/min)	Cumulative Discharge Volume (Liters)	NOTES color, odor etc.	Stabilized?
BEGIN PURGING											
14:25	23.51	7.77	-222	1.270	187	2.30	6.62		0.50		**N/A**
14:30	23.14	7.74	-245	1.210	147	0.29	6.62	0.15	1.25		**N/A**
14:35	22.91	7.68	-253	1.190	116	0.10	6.62	0.15	2.00		**N**
14:40	22.84	7.57	-246	1.110	82	0.06	6.62	0.25	3.25		**N**
14:45	22.80	7.53	-242	1.100	70	0.05	6.62	0.30	4.75	Faint petroleum-like odor; cloudy, yellow hue; max. PID 0.0	**N**
14:50	22.80	7.48	-234	1.090	60	0.03	6.62	0.15	5.50		**N**
14:55	22.72	7.43	-224	1.080	43	0.09	6.61	0.15	6.25		**N**
15:00	22.76	7.41	-220	1.090	38	0.00	6.62	0.35	8.00		**N**
15:05	22.74	7.39	-217	1.090	31	0.00	6.60	0.30	9.50		**N**
15:10	22.76	7.37	-213	1.090	30	0.00	6.62	0.30	11.00		**N**
15:15	22.75	7.36	-209	1.090	23	0.00	6.62	0.20	12.00		**N**
15:20	22.74	7.35	-206	1.090	20	0.00	6.62	2.40			**N**

Notes:

1. Well depths and groundwater depths were measured in feet below the top of well casing (stickup removed), northern most point.
2. Well and tubing diameters are measured in inches.
3. PID = Photoionization Detector
4. PPM = Parts per million
5. pH = Hydrogen ion concentration
6. ORP = Oxidation-reduction potential, measured in millivolts (mV)
7. DO = Dissolved Oxygen, measured in milligrams per liter (mg/L)
8. DTW = Depth to water
9. mS/cm = milli-Siemens per centimeter
10. NTU = Nephelometric Turbidity Unit
11. mg/L = milligrams per liter
12. L/min = liters per minute

Calculated Flow Rate		
Volume (L)	**Time (m:s)**	**Flow Rate (L/min)**
0.148	51:00.0	0.174

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APPENDIX F

SPILL NO. 0302857 DOCUMENTATION

An official website of New York State.
Here's how you know

NYS Department of Environmental Conservation
DER Environmental Remediation Databases

Details from Spill Incidents Database Search

Spill Record

Administrative Information

DEC Region: 2
Spill Number: 0302857

Spill Date/Time

Spill Date: 06/17/2003
Spill Time: 10:30:00 AM
Call Received Date: 06/17/2003
Call Received Time: 04:21:00 PM

Location

Spill Name: FORMER GAS STATION
Address: 1709-29 SURF AVE
City: BROOKLYN
County: Kings

Spill Description

Material Spilled	Amount Spilled	Resource Affected
gasoline	Unknown	Soil

Cause: Unknown

Source: Gasoline Station or other PBS Facility

Waterbody:

Record Close

Date Spill Closed: 12/20/2011

"Date Spill Closed" means the date the spill case was closed by the case manager in the Department of Environmental Conservation (the Department). The spill case was closed because either; a) the records and data submitted indicate that the necessary cleanup and removal actions have been completed and no further remedial activities are necessary, or b) the case was closed for administrative reasons (e.g., multiple reports of a single spill consolidated into a single spill number). The Department however reserves the right to require additional remedial work in relation to the spill, if in the future it determines that further action is necessary.

If you have questions about this reported incident, please contact the Regional Office where the incident occurred.

Refine This Search

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- Русский
- ייִדיש
- বাংলা
- 한국어
- Kreyòl Ayisyen

APPENDIX G

AS-BUILT SMD SYSTEM DRAWINGS

GENERAL NOTES

1. SCOPE OF WORK INCLUDES THE INSTALLATION OF A SUB-MEMBRANE DEPRESSURIZATION (SMD) SYSTEM IN CONJUNCTION WITH DOB NOW JOB NUMBER B00917292-S9.
2. THE COMPONENTS SHOWN ARE NOT TO SURVEYED COORDINATES. THE CONTRACTOR SHALL COORDINATE THE EXACT LOCATIONS AND LAYOUT OF THE VENTING SYSTEM COMPONENTS IN THE FIELD BASED ON ACTUAL SITE CONDITIONS AND OTHER PROPOSED WORK.
3. DRAWING SET NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL, OR OTHER REFERENCE EXCEPT FOR SMD SYSTEM.
4. REFER TO ARCHITECTURAL DRAWINGS FOR INSULATION REQUIREMENTS (INSULATION NOT REQUIRED AROUND SMD SYSTEM PIPING).
5. ANY DEVIATION FROM THIS DESIGN MUST BE SUBMITTED TO THE OWNER AND ENGINEER OF RECORD FOR APPROVAL.
6. INSTALLATION OF THE SMD SYSTEM COMPONENTS AND RISER PIPE MUST BE COORDINATED WITH THE INSTALLATION OF OTHER UTILITIES AND STRUCTURAL COMPONENTS.
7. INSTALLATION OF THE SMD SYSTEM COMPONENTS, TESTING (I.E., PRESSURE TESTING), AND START-UP SHALL BE COMPLETED UNDER THE OVERSIGHT OF THE ENGINEER OF RECORD.
8. WE ASSUME THAT ALL INTERIOR SPACE AIR PRESSURES WILL BE BALANCED OR POSITIVELY PRESSURIZED WITH VENTILATION SYSTEMS AND THE INDOOR AIR PRESSURE WILL BE ESSENTIALLY EQUAL TO OR GREATER THAN THE OUTDOOR AIR PRESSURE.

DRAWING LIST

SHEET NO.	SHEET TITLE	DOB SET
H-001.00	SUB-MEMBRANE DEPRESSURIZATION SYSTEM NOTES	1
H-100.00	SITE PLAN	2
H-101.00	SUB-MEMBRANE DEPRESSURIZATION SYSTEM PLAN	3
H-102.00	SUB-MEMBRANE DEPRESSURIZATION SYSTEM RISER PLAN (LEVEL 01)	4
H-103.00	SUB-MEMBRANE DEPRESSURIZATION SYSTEM RISER PLAN AND DETAILS (LEVEL 2-10)	5
H-104.00	SUB-MEMBRANE DEPRESSURIZATION SYSTEM RISER PLAN (LEVEL 11 TO ROOF)	6
H-105.00	SUB-MEMBRANE DEPRESSURIZATION SYSTEM BLOWER PLAN AND DETAILS	7
H-201.00	SUB-MEMBRANE DEPRESSURIZATION SYSTEM DETAILS	8
EN-001.00	ENERGY CODE COMPLIANCE	9

SCOPE OF WORK

- INSTALLATION OF THE SMD STONE LAYER AND SMD/VAPOR COLLECTION SUB-SLAB PIPING
- INSTALLATION OF VAPOR BARRIER MEMBRANE, BUILDING SLAB, AND PERMANENT MONITORING POINTS
- INSTALLATION OF RISER PIPES AND ROOF-MOUNTED PROCESS EQUIPMENT
- INSTALLATION OF ELECTRICAL CONNECTIONS TO PROCESS EQUIPMENT
- STARTUP OF THE REMEDIAL SYSTEM

SUB-MEMBRANE DEPRESSURIZATION SYSTEM NOTES

1. REFER TO DRAWINGS H-100.00 THROUGH H-105.00 AND H-201.00 FOR SMD SYSTEM DETAILS AND SECTIONS.
2. THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR OWNER APPROVAL PRIOR TO THE SMD SYSTEM INSTALLATION. ANY CONDITION OR DETAIL NOT DEPICTED IN THESE DRAWINGS SHALL BE PROVIDED AS A SHOP DRAWING FOR APPROVAL.
3. SMD SYSTEM PIPE, FITTINGS, UNIONS, CLEANOUTS, SLEEVES, SUPPORTS, HANGERS, AND RELATED ACCESSORIES SHALL BE FURNISHED IN ACCORDANCE WITH THE REQUIREMENTS FOR PLUMBING SANITARY VENT PIPING IN DIVISION 15. REFER TO PLUMBING DRAWINGS FOR SMD SYSTEM PIPING SUPPORTS.
4. SUBMIT DETAIL OF ANY SITE SPECIFIC SMD SYSTEM CONDITIONS NOT SHOWN FOR OWNER APPROVAL.
5. SLOPE ALL SOLID (UNPERFORATED) PIPE A MINIMUM OF 1% UNIFORMLY DOWNWARD TOWARDS SMD SYSTEM PIPING OR CONDENSATE DRAINS. ANY ACCUMULATED MOISTURE/WATER MUST BE ALLOWED TO DRAIN TO THE SUBSURFACE. PIPING SHALL NOT BE TRAPPED AND CONDENSATE DRAINS SHALL NOT BE INSTALLED IN ABOVE SLAB PIPING.
6. CONDENSATE DRAIN FOR SUB-SLAB PIPING MAY BE AN OPTION, WITH WRITTEN ENGINEER APPROVAL, IF CONFLICT WITH UTILITIES REQUIRES REVERSE SLOPE (SEE DETAIL 8/H-201)
7. COAT ANY PIPING IN DIRECT CONTACT WITH CONCRETE IN ACCORDANCE WITH PLUMBING CODES.
8. 3/4-INCH STONE USED IN DEPRESSURIZATION LAYER SHALL BE VIRGIN, COARSE, ANGULAR, WASHED STONE WITH THE FOLLOWING GRADATION (ASTM/AASHTO #5 SIZE STONE)

SIEVE SIZE	% PASSING BY WEIGHT
1 1/2"	100
1"	90-100
3/4"	20-55
3/8"	0-10
#4	0-5

9. DESIGN DETAILS AND DRAWINGS ARE ADAPTED FROM EPA DOCUMENT EPA/625/R-92/016.
10. ALL PIPING SHALL BE INSTALLED IN ACCORDANCE WITH THE NEW YORK CITY MECHANICAL AND PLUMBING CODE, INCLUDING, BUT NOT LIMITED TO, THOSE REQUIREMENTS PERTAINING TO:
    - PROTECTION OF SYSTEM COMPONENTS
    - TRENCHING, EXCAVATION, AND BACKFILL
    - STRUCTURAL SAFETY
    - PIPING SUPPORT
    - JOINTS
    - RISER LOCATION
    - MATERIALS OF CONSTRUCTION
11. ALL ABOVEGROUND AND BELOW GRADE SMD SYSTEM PIPES SHALL BE PROVIDED WITH PIPE HANGERS IN ACCORDANCE WITH THE REQUIREMENTS ON THE PLUMBING DRAWINGS AND SPECIFICATIONS.
12. UNLESS OTHERWISE SPECIFIED, ALL UNDERGROUND PIPING SHALL BE CONSTRUCTED OF 4"Ø SCHEDULE 80 POLYVINYL CHLORIDE (PVC) AND ALL ABOVEGROUND RISER PIPING SHALL BE CONSTRUCTED OF 4"Ø CAST IRON OR GALVANIZED STEEL OR OTHER MATERIAL THAT COMPLIES WITH BUILDING CODE.
13. ALL FITTINGS AND CONNECTIONS FOR THE VAPOR COLLECTION PIPE SHALL BE 4-INCH-DIAMETER SCHEDULE 40 PVC FITTINGS, MADE BY THE SAME MANUFACTURER AS THE 4-INCH-DIAMETER PIPE, AND OF THE TYPE RECOMMENDED BY THE MANUFACTURER FOR USE WITH THE 4-INCH-DIAMETER PIPE. SECURE ALL FITTINGS WITH 2-INCH-WIDE TILE TAPE.
14. INSTALLATION OF THE SUB-SLAB COMPONENTS, AND RISER PIPING AND VENT, AND ROOF PENETRATIONS MUST BE COORDINATED WITH OTHER TRADES FOR THE INSTALLATION OF OTHER UTILITIES AND STRUCTURAL COMPONENTS.
15. RISER PIPE FROM SUB-SLAB TO ROOF SHALL BE COORDINATED WITH THE ARCHITECT AND MECHANICAL ENGINEER. RISER PIPE SHALL BE EXTENDED TO THE ROOF WITH MINIMAL CHANGES IN DIRECTION (i.e., NO MORE THAN 3 ROUTING ALTERATIONS FROM A STRAIGHT VERTICAL RISER PIPE); NO 90-DEGREE CHANGES IN DIRECTION ARE ALLOWED, 45-DEGREE FITTINGS ARE PREFERRED.
16. SYSTEM INSTALLATION SHALL ADHERE TO: OCTOBER 2006 FINAL GUIDANCE FOR EVALUATING SOIL VAPOR INTRUSION IN THE STATE OF NEW YORK PREPARED BY NEW YORK STATE DEPARTMENT OF HEALTH (NYSDOH), ALL APPLICABLE PORTIONS OF THE BUILDING CODE OF THE CITY OF NEW YORK, INCLUDING BUT NOT LIMITED TO 2022 NEW YORK CITY MECHANICAL CODE, CHAPTER 5, SECTION MC 512 SUBSLAB SOIL EXHAUST SYSTEMS.
17. RISER PIPE (REFER TO ARCHITECTURAL AND MEP DRAWINGS FOR DESIGN AND LOCATION OF ABOVE-SLAB PIPING) SHALL BE EXTENDED TO THE ROOF WITH MINIMAL CHANGES IN DIRECTION AS SHOWN ON THE MECHANICAL AND PLUMBING DRAWINGS. HORIZONTAL RISER PIPE RUNS MUST MAINTAIN A MINIMUM SLOPE OF 1/8 INCHES PER LINEAR FOOT, SLOPING DOWNWARD TOWARD THE PERFORATED PIPING OR SLAB (FOR BELOW GRADE SOLID PIPE) OR SLOPING BACK TOWARDS THE RISER (FOR ABOVE-SLAB SOLID PIPE).
18. RISER PIPE SHALL BE AIR-TIGHT. THE CONTRACTOR SHALL PERFORM PRESSURE TESTING TO DEMONSTRATE THAT THE RISER PIPE IS AIR-TIGHT BEFORE IT IS PUT INTO SERVICE. PRESSURE TESTING SHALL BE COMPLETED AT EVERY VERTICAL VENT RISER PIPE TO CONFIRM NO DAMAGE TO THE ABOVE GRADE SMD PIPES. PRESSURE TESTING WILL INVOLVE ISOLATING THE RISERS AND SHALL GENERALLY FOLLOW THE TESTING PROCEDURES SET FORTH IN ASME B31.1. A MINIMUM OF 2 INCHES OF MERCURY (IN.HG) SHALL BE APPLIED TO THE PIPE AND MAINTAINED FOR A MINIMUM OF 10 MINUTES. ANY DAMAGE OR DEFECT DETECTED SHALL BE REPAIRED OR REPLACED.
19. EXHAUST STACKS SHALL BE SECURELY ANCHORED WITH ADEQUATE STRUCTURAL SUPPORTS AS SHOWN ON DETAILS AND REQUIRED IN THE SPECIFICATIONS.
20. LOCATIONS OF RISER PIPE FROM SUB-MEMBRANE TO ROOF SHALL BE COORDINATED WITH ARCHITECT AND MECHANICAL ENGINEER. RISER PIPE SHALL BE EXTENDED TO THE ROOF WITH MINIMAL CHANGES IN DIRECTION. SEE DRAWINGS H-101.00 THROUGH H-105.00 FOR RISER LOCATIONS.
21. RISER PIPE MUST BE CLEARLY LABELED "CAUTION: DO NOT ALTER SUB-SLAB VAPOR VENT PIPE" IN EACH ACCESSIBLE AREA A MINIMUM OF EVERY 10 LINEAR FEET OF RISER PIPE RUN.
22. SMD SYSTEM EFFLUENT DISCHARGE POINTS SHALL BE:
    - COORDINATED WITH ARCHITECT AND MECHANICAL ENGINEER;
    - ABOVE THE EAVE OF THE ROOF (PREFERABLY, ABOVE THE HIGHEST EAVE OF THE BUILDING AND AT LEAST 24-INCHES ABOVE THE SURFACE OF THE ROOF);
    - AT LEAST 10 FEET ABOVE GROUND LEVEL;
    - AT LEAST 10 FEET AWAY FROM ANY OPERABLE AIR INTAKE THAT IS LESS THAN 2 FEET BELOW THE EXHAUST POINT; AND
    - 10 FEET FROM ANY ADJOINING OR ADJACENT BUILDINGS, OR HVAC INTAKES OR SUPPLY REGISTERS
23. ALL EXTERNAL PIPES SHALL BE PAINTED WITH A UV-RATED AND/OR CORROSION RESISTANT COATING, DEPENDING ON PIPE MATERIAL.
24. CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS (SIGNED AND SEALED BY A NYS-LICENSED PROFESSIONAL ENGINEER) OF COMPLETE SMD SYSTEM TO OWNER FOLLOWING INSTALLATION. THE SUBSURFACE SYSTEM COMPONENTS (E.G. PIPES) SHALL BE SURVEYED BY A NYS LICENSED SURVEYOR.

WATERPROOFING/VAPOR BARRIER NOTES

1. REFER TO ARCHITECTURAL AND FOUNDATION PLANS FOR WATERPROOFING/VAPOR BARRIER (WP/VB) DESIGN.
2. WP/VB SHALL BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE MANUFACTURER GUIDELINES AND DETAILS.
3. WP/VB SHALL BE INSTALLED BY A MANUFACTURER-CERTIFIED OR -APPROVED INSTALLER.
4. WP/VB SHALL BE INSPECTED IMMEDIATELY BEFORE CONCRETE IS PLACED. ALL PENETRATIONS, HOLES, AND/OR TEARS SHALL BE SEALED BEFORE CONCRETE IS PLACED. THE WP/VB DETAILS SHOWN ARE GENERALIZED IN NATURE AND ARE INTENDED TO INDICATE THE EXTENT AND LOCATIONS OF THE WP/VB. ACTUAL INSTALLATION AND REPAIRS SHALL BE IN ACCORDANCE WITH THE WP/VB MANUFACTURER'S STANDARD DETAILS AND WRITTEN INSTALLATION INSTRUCTIONS. ALL STANDING WATER AND SOIL/DEBRIS MUST BE REMOVED FROM THE VAPOR BARRIER BEFORE CONCRETE IS PLACED. POTABLE WATER OR COMPRESSED AIR CAN BE USED TO CLEAN THE SURFACE BEFORE CONCRETE IS PLACED.
5. CONTRACTOR SHOP DRAWINGS INDICATING WP/VB INSTALLATION DETAILS AND METHODS SHALL BE REVIEWED AND APPROVED BY THE MATERIAL MANUFACTURER PRIOR TO SUBMITTAL TO THE ENGINEER OF RECORD FOR REVIEW.
6. ALL WP/VB ACCESSORY MATERIALS, INCLUDING BUT NOT LIMITED TO TAPE, SEALANT, LIQUID MEMBRANE, ETC. SHALL BE COMPATIBLE WITH AND DESIGNED FOR USE WITH THE SELECTED WP/VB.
7. INSTALLED WP/VB MATERIALS AND INSTALLATION SHALL HAVE WARRANTIES PROVIDED BY THE INSTALLER AND MANUFACTURER.
8. DO NOT PENETRATE THE VAPOR BARRIER MEMBRANE. CARE SHALL BE TAKEN DURING THE PLACEMENT OF THE SLAB REINFORCING REBAR AND THE POURING OF THE BUILDING SLAB TO PREVENT ACTIVITIES (I.E., VEHICLE TRAFFIC DIRECTLY ON TOP OF VAPOR BARRIER) WHICH MAY DAMAGE THE VAPOR BARRIER PRIOR TO INSTALLING THE BUILDING SLAB. IF VEHICLE TRAFFIC OVER THE VAPOR BARRIER IS REQUIRED, PROPER PRECAUTIONS SHALL BE COORDINATED WITH THE ENGINEER OF RECORD PRIOR TO INITIATING SUCH WORK. IT IS THE GENERAL CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE MEMBRANE IS NOT PENETRATED OR DAMAGED.
9. THE WP/VB SHALL BE INSPECTED FOR HOLES, PUNCTURES AND GAPS. ALL LEAKS SHALL BE PATCHED PER THE MANUFACTURER'S INSTRUCTIONS AND RETESTED.
10. THE WP/VB MATERIALS ARE INTENDED TO MITIGATE INTRUSION OF CONTAMINATED SUB-SLAB VAPORS INTO OCCUPIED BUILDING SPACES. IF IS ALSO REQUIRED, THIS SHALL BE COORDINATED ACCORDINGLY TO ENSURE COMPATIBLE MATERIALS ARE SELECTED AND APPLIED.

INSPECTION SCHEDULE

No.	MILESTONE DESCRIPTION	DATE COMPLETED
1	DELIVERY OF GAS PERMEABLE AGGREGATE TO THE SITE.	
2	SUB-MEMBRANE DEPRESSURIZATION PIPING INSTALLATION PROGRESS, AT A MINIMUM, 25% COMPLETENESS.	
3	SUB-MEMBRANE DEPRESSURIZATION PIPING INSTALLATION PROGRESS, AT A MINIMUM, 50% COMPLETENESS.	
4	SUB-MEMBRANE DEPRESSURIZATION PIPING INSTALLATION PROGRESS, AT A MINIMUM, 75% COMPLETENESS.	
5	SUB-MEMBRANE DEPRESSURIZATION PIPING INSTALLATION PROGRESS, AT A MINIMUM, 100% COMPLETENESS.	
6	INSTALLATION OF VACUUM MONITORING POINTS (VMP).	
7	COMPLETION OF GAS PERMEABLE AGGREGATE LAYER.	
8	COMPLETION OF INSTALLATION OF ALL PORTIONS OF ABOVE-SLAB PIPING FROM THE RISER STUB-UP TO THE ROOF (INCLUDING LABELS ON EXPOSED PORTIONS OF THE ABOVE-SLAB RISER PIPING).	
9	PRESSURE TESTING OF COMPLETED INTERIOR PIPES.	
10	INSTALLATION OF BLOWERS/SUCTION FANS AND ACCESSORIES.	
11	INSTALLATION OF ALARM INDICATOR STATION (AIS) AND TESTING	
12	PLACEMENT OF FINISHED FLOOR SLAB.	
13	START-UP OF COMPLETED SYSTEM.	

CODE COMPLIANCE NOTES

1. THE SMD SYSTEM COMPLIES WITH THE REQUIREMENTS OF THE 2022 NYC MECHANICAL CODE, CHAPTER 5, SECTION 512, "SUB-SLAB SOIL EXHAUST SYSTEMS".
2. THE SMDS IS NOT A "HAZARDOUS EXHAUST SYSTEM", AS DEFINED IN THE 2022 NYC MECHANICAL CODE SECTION 510.
3. CHAPTER 6, "DUCT SYSTEMS", PARAGRAPH 601.4, "CONTAINMENT PREVENTION", OF THE 2022 NYC MECHANICAL CODE DOES NOT APPLY TO THE SMDS.
4. CHAPTER 6, "DUCT SYSTEMS", PARAGRAPH 607.5.5.2, "LIMITATIONS", OF THE 2022 NYC MECHANICAL CODE DOES NOT APPLY TO THE SMDS.
5. THE SMDS IS NOT DESIGNED TO VENT METHANE OR RADON.
6. THE CONTRACTOR SHALL OBTAIN "CERTIFICATE OF COMPLIANCE" REQUIRED IN ACCORDANCE WITH CHAPTER 1 OF TITLE 28 OF THE ADMINISTRATIVE CODE, ARTICLE 116, 28-116.4.1. CERTIFICATE OF COMPLIANCE SHALL BE REQUIRED FOR THE USE AND OPERATION OF THE SMDS.
7. PLEASE REFER TO NEW BUILDING APPLICATION DOB NOW JOB NUMBER B01017650-S6 FOR ALL BUILDING DEPARTMENT NOTES, APPLICABLE INSPECTIONS, AND LIST OF DRAWINGS.

PERMITS:
CONTRACTOR SHALL FILE FOR AND OBTAIN PERMITS FOR ALL MECHANICAL SYSTEMS. PERMITS SHALL COMPLY WITH CHAPTER 1 ADMINISTRATION, TITLE 28, SECTION MC 105.

LISTED AND LABELED:
ALL APPLIANCES REGULATED BY 2022 NYC MECHANICAL CODE SHALL BE LISTED AND LABELED AS REQUIRED BY CHAPTER 1, MC 301.7. LABEL INFORMATION SHALL COMPLY WITH REQUIREMENTS OF CHAPTER 1, MC 301.9.

VIBRATION ISOLATION:
ALL MECHANICAL EQUIPMENT SHALL BE MOUNTED AND SUPPORTED AND PROVIDED WITH VIBRATION ISOLATORS AS REQUIRED BY 2022 NYC MECHANICAL, CHAPTER 3, MC 313.3.

WIND RESISTANCE:
ALL MECHANICAL EQUIPMENT, APPLIANCES, AND SUPPORTS THAT ARE EXPOSED TO WIND SHALL BE DESIGNED AND INSTALLED AS PER 2022 NYC BUILDING CODE CHAPTER 16, SECTION BC 1609 "WIND LOADS".

FIRE STOPPING COMPLIANCE NOTE:
- FOR FIRE STOPPING AT ANY FIRE RATED CONSTRUCTION PENETRATION, CONTRACTOR SHALL REFER TO ARCHITECTURAL DRAWING SET (ARCHITECTURAL DRAWING A-501.00).
- ALL DUCT AND PIPE PENETRATIONS OF RATED CONSTRUCTION SHALL COMPLY WITH 2022 NYC BUILDING CODE, CHAPTER 7, SECTIONS BC 711 AND 714.

SUBMITTALS/DELIVERABLES

1. CONTRACTOR TO PROVIDE MANUFACTURER CUT SHEETS FOR ALL PROPOSED COMPONENTS OF THE SMD SYSTEM (INCLUDING BUT NOT LIMITED TO PVC VAPOR COLLECTION PIPING, PVC PIPE FITTINGS, 3/4-INCH CLEAN STONE, VAPOR BARRIER, METAL RISER PIPE, RISER PIPE FITTINGS SUB-SLAB VACUUM MONITORING POINTS, AND BLOWERS (IF REQUIRED)) BEFORE PROCUREMENT AND INSTALLATION.
2. CONTRACTOR TO PROVIDE DETAILED SHOP DRAWINGS TO THE EOR ENGINEER FOR REVIEW PRIOR TO INSTALLATION OF DEPRESSURIZATION SYSTEM COMPONENTS.
3. CONTRACTOR TO PROVIDE PROOF OF CERTIFICATION FOR VAPOR BARRIER INSTALLER AS A CONSTRUCTION SUBMITTAL FOR REVIEW.
4. CONTRACTOR MUST PROVIDE PE-STAMPED AS-BUILT DRAWINGS OF COMPLETED VAPOR BARRIER EXTENTS TO EOR ENGINEER FOLLOWING INSTALLATION.
5. CONTRACTOR MUST PROVIDE PE-STAMPED AS-BUILT DRAWINGS OF UNDER-SLAB AND ABOVE-SLAB SMD SYSTEM COMPONENTS TO EOR ENGINEER FOLLOWING INSTALLATION.
6. THE SUBSURFACE SYSTEM COMPONENTS (E.G. PIPES) SHALL BE SURVEYED BY A NYS LICENSED SURVEYOR

PROGRESS INSPECTIONS

PROGRESS INSPECTIONS REQUIRED UNDER CHAPTER 1 OF THE NYC BUILDING CODE AND THE APPLICABLE SECTIONS OF THE NYC CONSTRUCTION CODE ARE LISTED IN THE FOLLOWING TABLES.

THE CONTRACTOR MUST NOTIFY THE RELEVANT SPECIAL INSPECTOR OR SPECIAL INSPECTION AGENCY IN WRITING FOR SPECIAL INSPECTIONS AT LEAST 72 HOURS BEFORE THE SPECIFIC WORK COMMENCES.

THE "OWNER" SHALL BE RESPONSIBLE FOR THE FOLLOWING PROGRESS INSPECTIONS:

ENERGY CODE COMPLIANCE INSPECTIONS * TR8	BC 110.3.5
FINAL	BC 110.5 28-116.2.4.2 1 RCNY 101-10

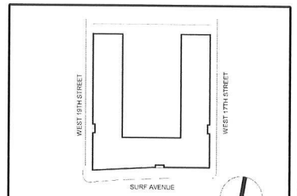
SPECIAL INSPECTIONS

SPECIAL INSPECTIONS REQUIRED UNDER THIS APPLICATION IN ACCORDANCE WITH CHAPTER 17 AND THE APPLICABLE SECTIONS OF THE NEW YORK CITY CONSTRUCTION CODE ARE LISTED IN THE FOLLOWING TABLES. SPECIAL INSPECTIONS FOR PORTIONS OF THE WORK THAT ARE FILED UNDER SEPARATE APPLICATION ARE NOT LISTED HERE AND ARE TO BE LISTED ON THOSE APPLICATIONS BY THE CONTRACTOR'S APPLICANT OF RECORD.

THE CONTRACTOR MUST NOTIFY THE RELEVANT SPECIAL INSPECTOR OR SPECIAL INSPECTION AGENCY IN WRITING FOR SPECIAL INSPECTIONS AT LEAST 72 HOURS BEFORE THE SPECIFIC WORK COMMENCES.

THE "OWNER" SHALL BE RESPONSIBLE FOR THE FOLLOWING SPECIAL INSPECTIONS:

MECHANICAL SYSTEMS	BC 1705.21
FIRE-RESISTANT PENETRATIONS AND JOINTS	BC 1705.17
POST-INSTALLED ANCHORS (BB# 2022-014)	BC 1705.37



PROJECT LOCATION MAP

SCALE: NOT TO SCALE

SOURCE:
CONEY ISLAND – PHASE 3 – 100%CD SUBMISSION

PROJECT NO. 170747001

DOB JOB NUMBER: B00917292-S9

Date	Description	No.
12/19/2025	PAA SUBMISSION	1

REVISIONS

STATE OF NEW YORK
JASON JAMES HAYES
SIGNATURE
12/15/25
DATE SIGNED
JASON J. HAYES, P.E.
NEW YORK LICENSE NO. 089491

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Project
1709 SURF AVENUE
BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS NEW YORK

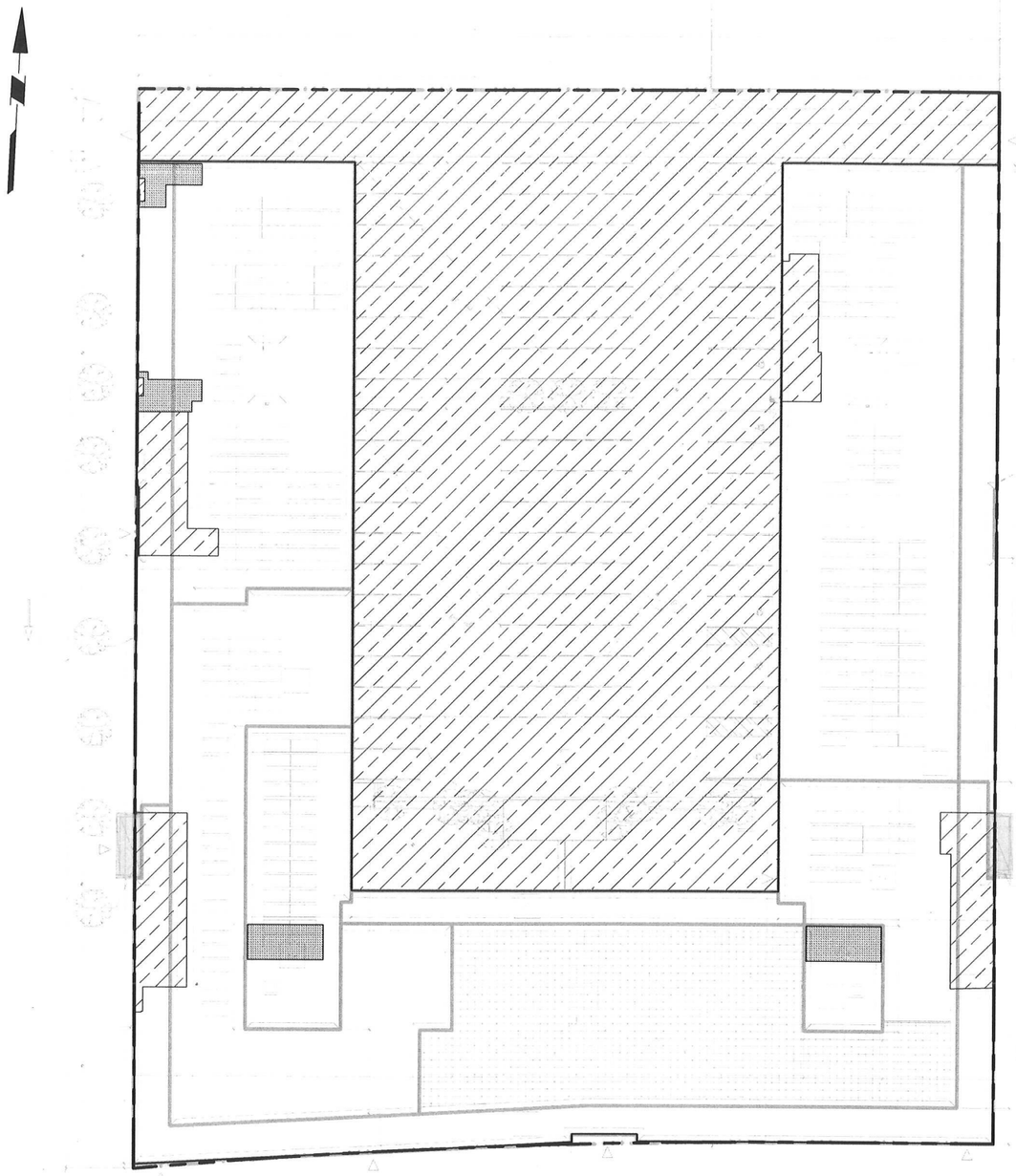
Drawing Title
SUB-MEMBRANE DEPRESSURIZATION SYSTEM NOTES

Project No.	Drawing No.
170747001	H-001.00
Date: 03/13/2025	
Drawn By: VK	
Checked By: LH	Sheet 1 of 9

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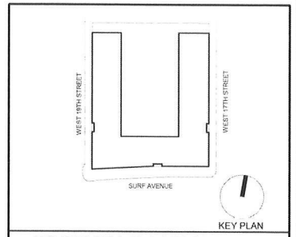
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1 / H-100 SITE PLAN
SCALE: 1" = 20'

LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE BUILDING EXTENT
- OPEN AIR SPACE
- NON-DEPRESSURIZED AREA



PROJECT LOCATION MAP
SCALE: NOT TO SCALE

SOURCE:
CONEY ISLAND – PHASE 3 – 100%CD SUBMISSION

GENERAL NOTES:

1. BASE MAP AND DIMENSIONS REFERENCED FROM G-003.00 "SITE PLAN", PROVIDED BY S9 ARCHITECTURE, DATED APRIL 02, 2024.
2. EXTENT OF THE NON-DEPRESSURIZED AREAS ARE HATCHED. DEPRESSURIZATION IS NOT REQUIRED WITHIN THESE HATCHED AREAS DUE TO THE FOLLOWING:
   - THE MAT FOUNDATION AND/OR FOUNDATION ELEMENTS EXTEND BELOW THE GROUNDWATER TABLE IN THESE AREAS
   - THE AREA IS OPEN-AIR

DOB JOB NUMBER: B00917292-S9		
Date	Description	No.
12/19/2025	PAA SUBMISSION / REVISION	1

SIGNATURE: JASON JAMES HAYES, P.E. DATE SIGNED: 12/15/2025
JASON JAMES HAYES, P.E.
NEW YORK LICENSE NO. 095828

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Project
1709 SURF AVENUE
BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS NEW YORK

Drawing Title
SITE PLAN

Project No.	Drawing No.
170747001	H-100.00
Date: 03/13/2025	
Drawn By: VK	
Checked By: LH	

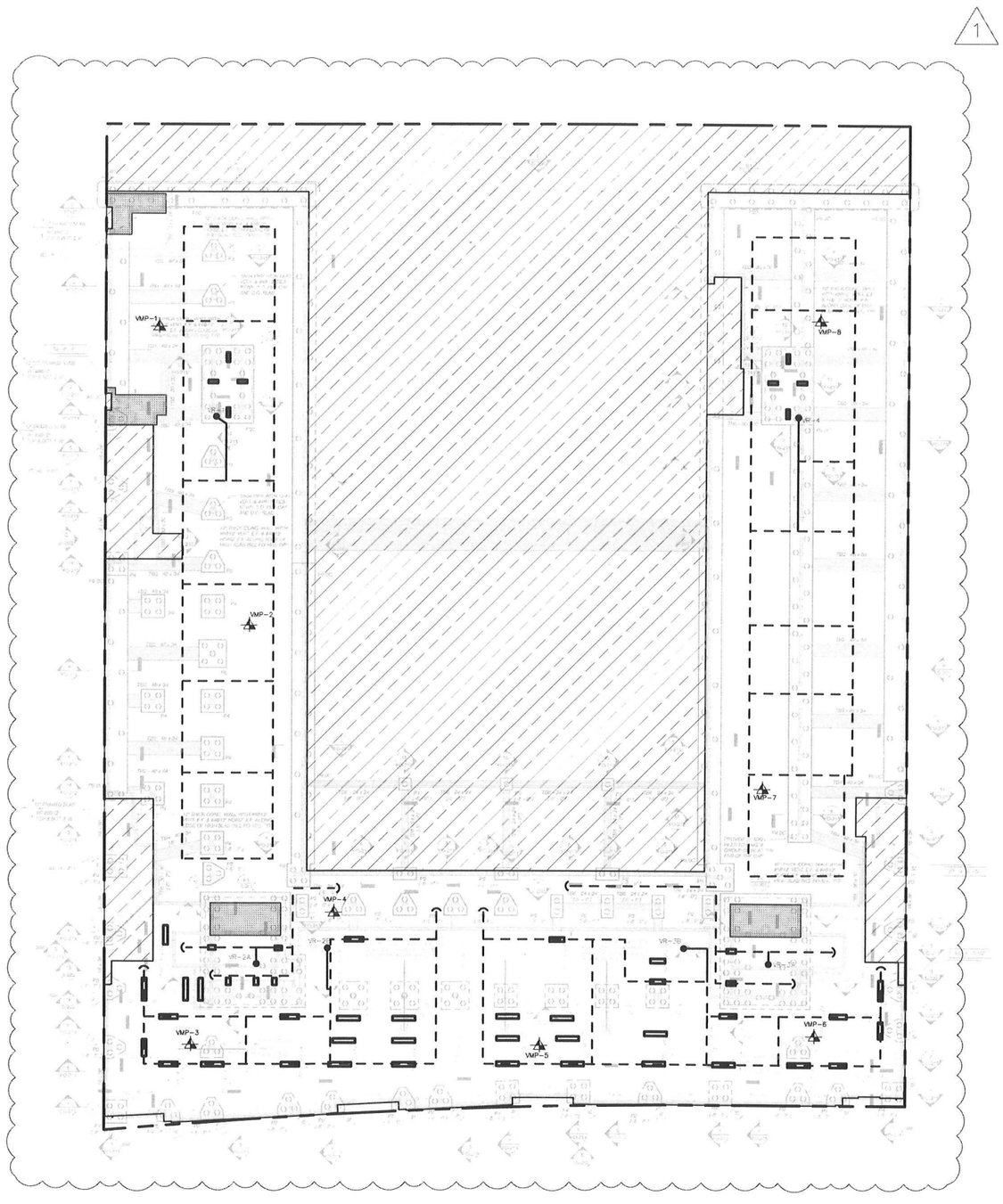
Sheet 2 of 9

PROJECT NO. 170747001

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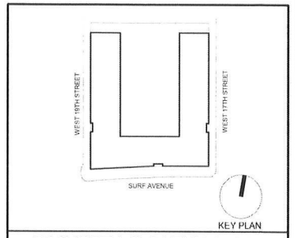
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1 / H-101 FOUNDATION PLAN
SCALE: 1" = 20'

LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE BUILDING EXTENT
- VMP-1 VACUUM MONITORING POINT LOCATION
- SMDS 4-INCH Ø SOLID PVC UNDERGROUND PIPING
- SMDS 4-INCH Ø PERFORATED PVC UNDERGROUND PIPING
- SMDS 4-INCH Ø PERFORATED PVC PIPING CAPPED AT END
- SMDS METAL PIPE SLEEVE THROUGH FOUNDATION ELEMENT
- VR-1 4-INCH Ø RISER PIPE PENETRATION THROUGH GROUND FLOOR SLAB
- OPEN AIR SPACE
- NON-DEPRESSURIZED AREA



PROJECT LOCATION MAP
SCALE: NOT TO SCALE

SOURCE:
CONEY ISLAND – PHASE 3 – 100%CD SUBMISSION

NOTES:

1. ALL LOCATIONS ARE APPROXIMATE
2. SMDS = SUB-MEMBRANE DEPRESSURIZATION SYSTEM
3. PVC = POLYVINYL CHLORIDE
4. BACKGROUND ADAPTED FROM 100% CD SUBMISSION SET, FOUNDATION AND LOW GROUND FLOOR FRAMING PLAN FO-101.00, DATED APRIL 08, 2024, PROVIDED BY SEVERUD ASSOCIATES.
5. ELEVATIONS ARE REFERENCED TO FLOOR DATUM ELEVATION WHICH IS SET TO +13'-0" (DESIGN FLOOD ELEVATION) RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AS ESTABLISHED AND MAINTAINED BY NATIONAL GEODETIC SURVEY OF THE NATIONAL OCEAN SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION OR SUCCESSOR AGENCY.

VACUUM MONITORING POINT SCHEDULE			
No.	VACUUM MONITORING POINT ID	SYSTEM	LOCATION
1	VMP-1	SYSTEM 1	COMMUNITY FACILITY
2	VMP-2	SYSTEM 1	COMMUNITY FACILITY
3	VMP-3	SYSTEM 2	RETAIL D
4	VMP-4	SYSTEM 2	MAIL ROOM
5	VMP-5	SYSTEM 3	RETAIL B
6	VMP-6	SYSTEM 3	RETAIL A
7	VMP-7	SYSTEM 4	PACKAGE ROOM
8	VMP-8	SYSTEM 4	WATER METER/ FIRE PUMP ROOM

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST. TO ALTER THIS ITEM IN ANY WAY.

DOB JOB NUMBER: B00917292-S9

Date	Description	No.
12/19/2025	DOB SUBMISSION / REVISION	1

STATE OF NEW YORK · JASON JAMES HAYES · 086491 · LICENSED PROFESSIONAL ENGINEER

SIGNATURE 12/19/2025 DATE SIGNED

JASON JAMES HAYES, P.E.
NEW YORK LICENSE NO. 086491

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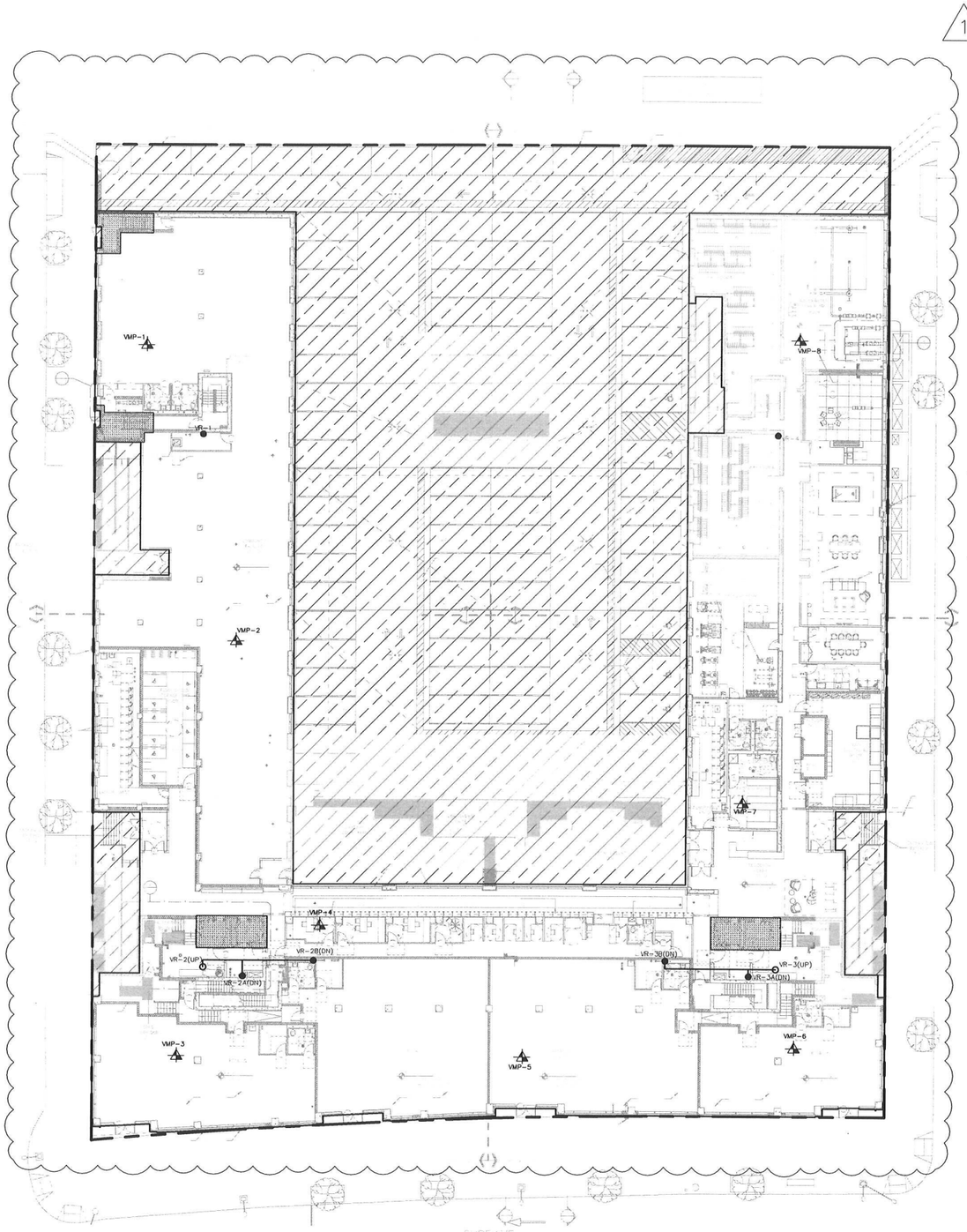
Project
1709 SURF AVENUE
BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS NEW YORK

Drawing Title
SUB-MEMBRANE DEPRESSURIZATION SYSTEM PLAN

Project No.	Drawing No.
170747001	H-101.01
Date: 03/13/2025	
Drawn By: VK	
Checked By: LH	Sheet 3 of 9

LANGAN PROJECT NO. 170747001

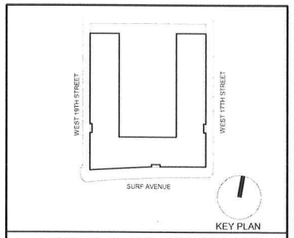
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1 H-102 ARCHITECTURAL PLAN
SCALE: 1" = 20'

LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE BUILDING EXTENT
- VMP–1 VACUUM MONITORING POINT LOCATION
- VR–1 4-INCH Ø METAL RISER PIPE PENETRATION THROUGH GROUND FLOOR SLAB
- 4-INCH Ø METAL RISER PIPE WITH A MINIMUM 1% SLOPE
- UP DN RISER PIPE OFFSET
- OPEN AIR SPACE
- NON-DEPRESSURIZED AREA



PROJECT LOCATION MAP
SCALE: NOT TO SCALE

SOURCE:
CONEY ISLAND – PHASE 3 – 100%CD SUBMISSION

NOTES:

1. ALL LOCATIONS ARE APPROXIMATE
2. SMDS = SUB-MEMBRANE DEPRESSURIZATION SYSTEM
3. BACKGROUND ADAPTED FROM 100% CD SUBMISSION SET, OVERALL FLOOR PLAN - LEVEL 01, A-101.00, DATED APRIL 02, 2024, PROVIDED BY S9 ARCHITECTURE.
4. RISER PIPE SLAB PENETRATIONS LABELED AS "DN" INDICATE LOCATIONS WHERE THE RISER PIPE IS PENETRATING THE LOWER FLOOR SLAB AND CONNECTING TO SUB-SURFACE VAPOR COLLECTION PIPE.
5. RISER PIPE SLAB PENETRATIONS LABELED AS "UP" INDICATE LOCATIONS WHERE THE RISER PIPE IS PENETRATING THE UPPER FLOOR SLAB.
6. ELEVATIONS ARE REFERENCED TO FLOOR DATUM ELEVATION WHICH IS SET TO +13'-0" (DESIGN FLOOD ELEVATION) RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AS ESTABLISHED AND MAINTAINED BY NATIONAL GEODETIC SURVEY OF THE NATIONAL OCEAN SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION OR SUCCESSOR AGENCY.
7. PIPE AND EQUIPMENT ARRANGEMENT SHOWN FOR SCHEMATIC PURPOSES ONLY. CONTRACTOR TO SUBMIT TO-SCALE DRAWING SHOWING PROPOSED ARRANGEMENT. CONTRACTOR IS REQUIRED TO OBTAIN APPROVAL OF ARRANGEMENT.
8. REFER TO H-103.00 FOR PIPE AND EQUIPMENT ARRANGEMENT DETAILS (NOT TO SCALE). NOTE THAT NOT ALL ACCESSORIES ARE SHOWN.

VACUUM MONITORING POINT SCHEDULE

No.	VACUUM MONITORING POINT ID	SYSTEM	LOCATION
1	VMP-1	SYSTEM 1	COMMUNITY FACILITY
2	VMP-2	SYSTEM 1	COMMUNITY FACILITY
3	VMP-3	SYSTEM 2	RETAIL D
4	VMP-4	SYSTEM 2	MAIL ROOM
5	VMP-5	SYSTEM 3	RETAIL B
6	VMP-6	SYSTEM 3	RETAIL A
7	VMP-7	SYSTEM 4	PACKAGE ROOM
8	VMP-8	SYSTEM 4	WATER METER/ FIRE PUMP ROOM

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DOB JOB NUMBER: B00917292–S9

Date	Description	No.
12/19/2025	DOB SUBMISSION	1
	REVISIONS	

STATE OF NEW YORK · JASON JAMES HAYES · 089401 · LICENSED PROFESSIONAL ENGINEER

SIGNATURE 12/15/2025 DATE SIGNED

JASON JAMES HAYES, P.E.
NEW YORK LICENSE NO. 089401

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Project
1709 SURF AVENUE
BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS NEW YORK

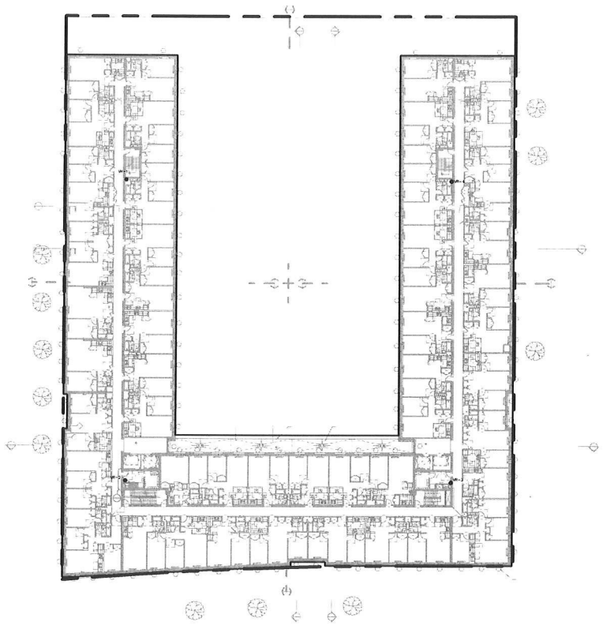
Drawing Title
SUB-MEMBRANE DEPRESSURIZATION SYSTEM RISER PLAN (LEVEL 01)

Project No.	Drawing No.
170747001	H-102.01
Date: 03/13/2025	
Drawn By: VK	
Checked By: LH	Sheet 4 of 9

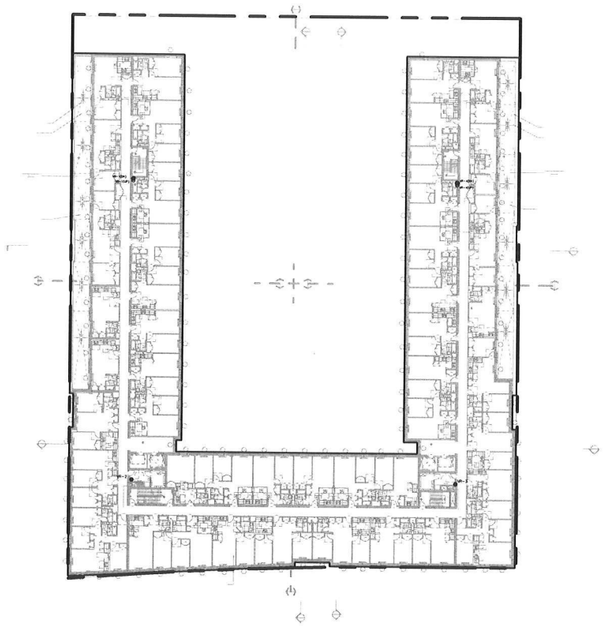
PROJECT NO. 170747001

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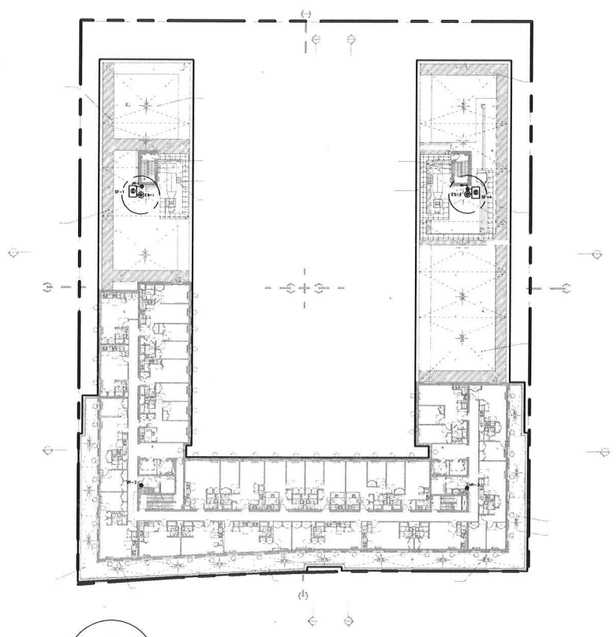
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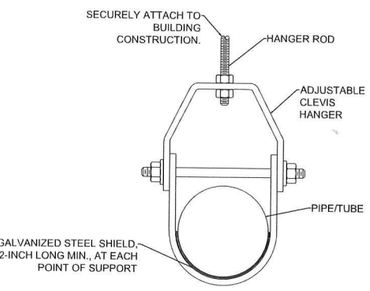
1 H-103 — OVERALL FLOOR PLAN: FLOORS 2-7
SCALE: 1" = 40'



2 H-103 — OVERALL FLOOR PLAN: FLOORS 8-9
SCALE: 1" = 40'

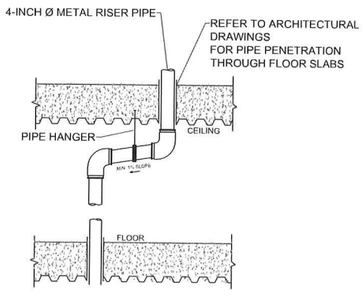


3 H-103 — OVERALL FLOOR PLAN: FLOOR 10
SCALE: 1" = 40'



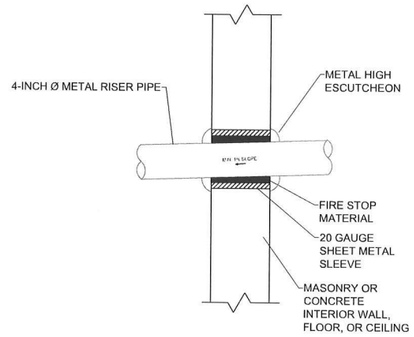
NOTE: INSTALL AS PER PLUMBING DRAWINGS AND DIVISION 15 SPECIFICATIONS.

4 H-103 — TYPICAL PIPE SUPPORT
SCALE: N.T.S.



NOTE: EXTEND RISER FROM THE FLOOR PENETRATION TO CEILING. INSTALL HORIZONTAL PIPING BENEATH CEILING AT 1% SLOPE TOWARD SUBSURFACE PIPE.

5 H-103 — TYPICAL RISER PIPE OFFSET
SCALE: N.T.S.

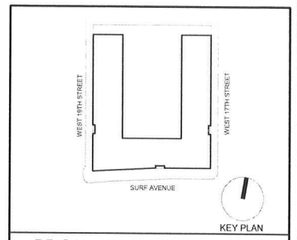


NOTE: INSTALL AS PER PLUMBING DRAWINGS AND DIVISION 15 SPECIFICATIONS, AND PROJECT FIRESTOPPING/SMOKE SEALS REQUIREMENTS.

6 H-103 — PIPE PENETRATION AT INTERIOR FLOOR/WALL/CEILING
SCALE: N.T.S.

LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE BUILDING EXTENT
- 4-INCH Ø METAL RISER PIPE
- VR-1 — 4-INCH Ø METAL RISER PIPE PENETRATION THROUGH LOWER FLOOR SLAB
- SF-1 — SUCTION FAN
- UP / DN — VERTICAL RISER OFFSET
- ES-1 — EXHAUST STACK
- BUILDING AIR INTAKE LOCATION 10-FOOT RADIUS



PROJECT LOCATION MAP
SCALE: NOT TO SCALE

SOURCE:
CONEY ISLAND – PHASE 3 – 100%CD SUBMISSION

NOTES:

1. ALL LOCATIONS ARE APPROXIMATE.
2. N.T.S. = NOT TO SCALE
3. REFER TO DRAWING H-105.00 FOR SMDS EQUIPMENT SCHEDULE, GENERAL NOTES, AND BLOWER NOTES.
4. NOT ALL REQUIRED ACCESSORIES ARE SHOWN.
5. BACKGROUNDS ADAPTED FROM 100% CD SUBMISSION SET, OVERALL FLOOR PLAN - LEVEL 02-07, A-102.00, OVERALL FLOOR PLAN - LEVEL 08-09, A-103.00, OVERALL FLOOR PLAN - LEVEL 10, A-104.00, DATED APRIL 02, 2024, PROVIDED BY S9 ARCHITECTURE.
6. RISER PIPE SLAB PENETRATIONS LABELED AS "DN" INDICATE LOCATIONS WHERE THE RISER PIPE IS PENETRATING THE LOWER FLOOR SLAB.
7. RISER PIPE SLAB PENETRATIONS LABELED AS "UP" INDICATE LOCATIONS WHERE THE RISER PIPE IS PENETRATING THE UPPER FLOOR SLAB.

DOB JOB NUMBER: 500917292-S3

Date	Description	No.
12/19/2025	PAA SUBMISSION	1
	REVISIONS	

STATE OF NEW YORK — JASON JAMES HAYES — LICENSED PROFESSIONAL ENGINEER
SIGNATURE — 12/19/2025 — DATE SIGNED
JASON J. HAYES, P.E.
NEW YORK LICENSE NO. 085491
PROFESSIONAL ENGINEER

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Project
1709 SURF AVENUE
BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS — NEW YORK

Drawing Title
SUB-MEMBRANE DEPRESSURIZATION SYSTEM RISER PLAN AND DETAILS (LEVEL 2-10)

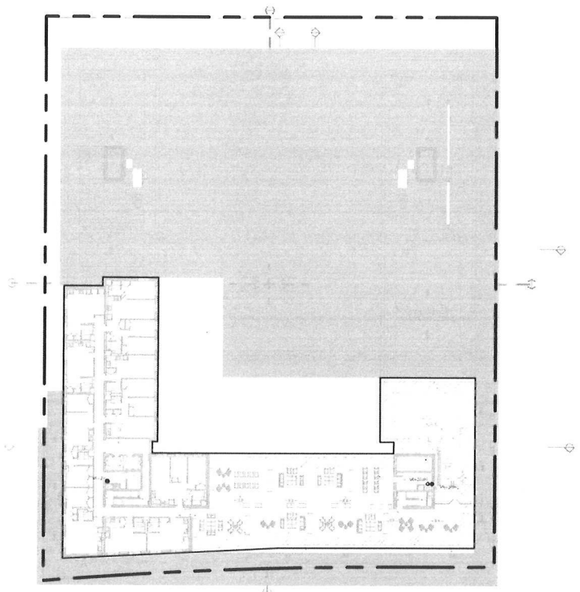
Project No.	Drawing No.
170747001	H-103.00
Date: 03/13/2025	
Drawn By: VK	
Checked By: LH	Sheet 5 of 9

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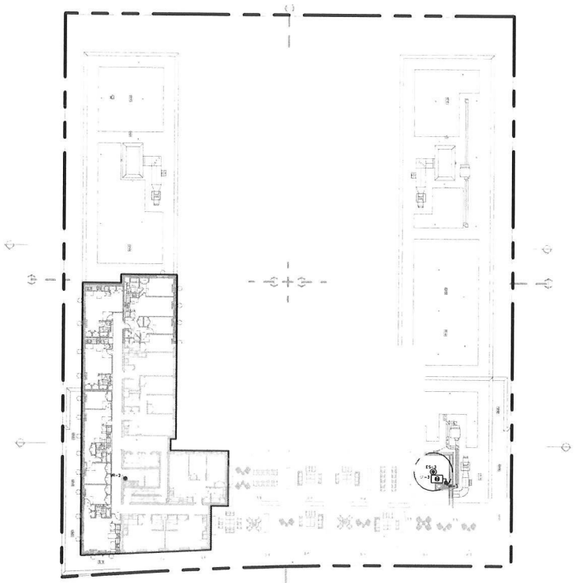
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PROJECT NO. 170747001 LANGAN

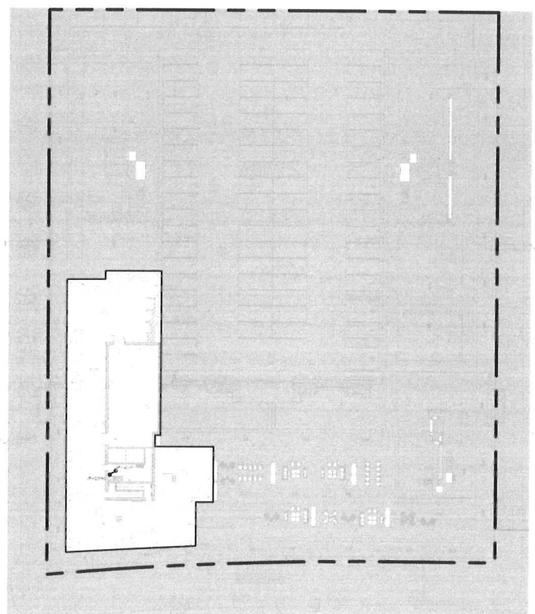
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1 H-104 OVERALL FLOOR PLAN: FLOOR 11
SCALE: 1" = 40'



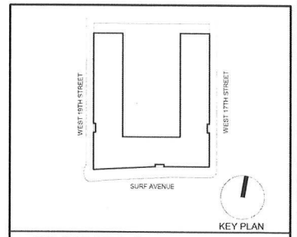
2 H-104 OVERALL FLOOR PLAN: FLOOR 12
SCALE: 1" = 40'



3 H-104 OVERALL FLOOR PLAN: ROOF AND BULKHEAD B
SCALE: 1" = 40'

LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE BUILDING EXTENT
- 4-INCH Ø METAL RISER PIPE
- VR-1 — 4-INCH Ø METAL RISER PIPE PENETRATION THROUGH LOWER FLOOR SLAB
- SF-1 — SUCTION FAN
- UP / DN — VERTICAL RISER OFFSET
- ES-1 — EXHAUST STACK
- BUILDING AIR INTAKE LOCATION 10-FOOT RADIUS



PROJECT LOCATION MAP
SCALE: NOT TO SCALE

SOURCE:
CONEY ISLAND – PHASE 3 – 100%CD SUBMISSION

NOTES:

1. ALL LOCATIONS ARE APPROXIMATE
2. BACKGROUNDS ADAPTED FROM 100% CD SUBMISSION SET, OVERALL FLOOR PLAN - LEVEL 11, A-105.00, OVERALL FLOOR PLAN - LEVEL 12, A-106.00, OVERALL FLOOR PLAN - ROOF, A-107.00, DATED APRIL 02, 2024, PROVIDED BY S9 ARCHITECTURE.
3. RISER PIPE SLAB PENETRATIONS LABELED AS "DN" INDICATE LOCATIONS WHERE THE RISER PIPE IS PENETRATING THE LOWER FLOOR SLAB.
4. RISER PIPE SLAB PENETRATIONS LABELED AS "UP" INDICATE LOCATIONS WHERE THE RISER PIPE IS PENETRATING THE UPPER FLOOR SLAB.
5. PIPE AND EQUIPMENT ARRANGEMENT SHOWN FOR SCHEMATIC PURPOSES ONLY. CONTRACTOR TO SUBMIT TO-SCALE DRAWING SHOWING PROPOSED ARRANGEMENT. CONTRACTOR IS REQUIRED TO OBTAIN APPROVAL OF ARRANGEMENT.
6. REFER TO H-103.00 FOR PIPE AND EQUIPMENT ARRANGEMENT DETAILS (NOT TO SCALE). NOTE THAT NOT ALL ACCESSORIES ARE SHOWN.
7. REFER TO DRAWING H-105.00 FOR SMDS EQUIPMENT SCHEDULE, GENERAL NOTES, AND BLOWER NOTES.

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DOB JOB NUMBER: B00917292-S9

Date	Description	No.
12/19/2025	PAA SUBMISSION	1

SIGNATURE — JASON JAMES HAYES, P.E. — NEW YORK LICENSE NO. 090491 — DATE SIGNED 12/15/2025

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Project
1709 SURF AVENUE
BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS NEW YORK

Drawing Title
SUB-MEMBRANE DEPRESSURIZATION SYSTEM RISER PLAN (LEVEL 11-ROOF)

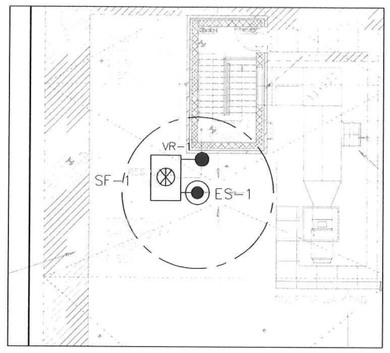
Project No.	Drawing No.
170747001	H-104.00
Date: 03/13/2025	
Drawn By: VK	
Checked By: LH	Sheet 6 of 9

PROJECT NO. 170747001

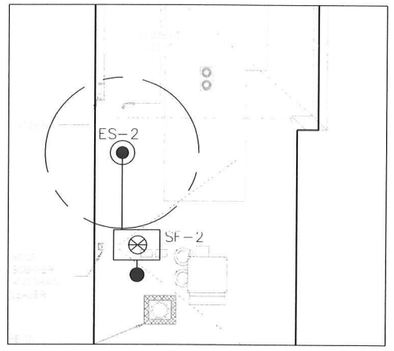
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APPENDIX G

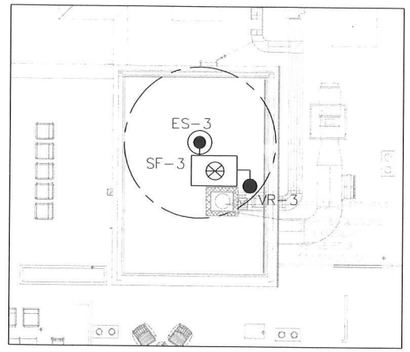
AS-BUILT SMD SYSTEM DRAWINGS



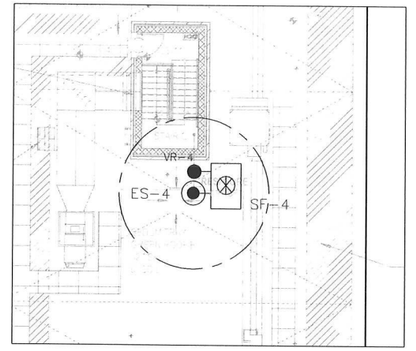
1 H-105 OVERALL FLOOR PLAN: FLOOR 10
SCALE: 1" = 10'



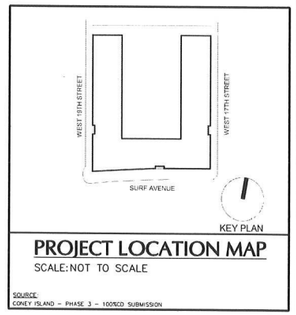
2 H-105 OVERALL FLOOR PLAN: ROOF
SCALE: 1" = 10'



3 H-105 OVERALL FLOOR PLAN: FLOOR 12
SCALE: 1" = 10'



4 H-105 OVERALL FLOOR PLAN: FLOOR 10
SCALE: 1" = 10'



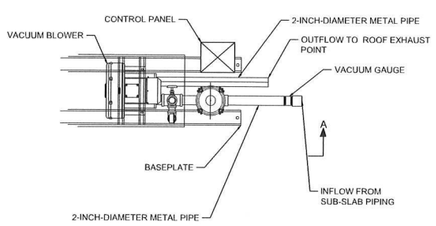
PROJECT LOCATION MAP
SCALE: NOT TO SCALE
SOURCE:
CONEY ISLAND – PHASE 3 – 100%CD SUBMISSION

PROJECT NO. 170747001

LANGAN

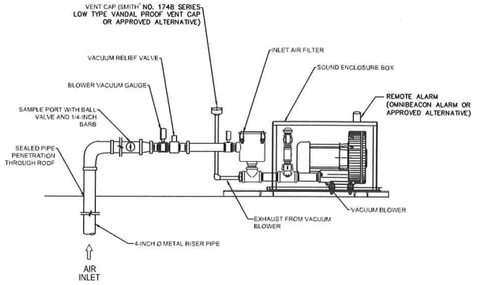
LEGEND:

- 4-INCH Ø METAL RISER PIPE
- VR-1 — 4-INCH Ø METAL RISER PIPE PENETRATION THROUGH LOWER FLOOR SLAB
- SF-1 — SUCTION FAN
- ES-1 — EXHAUST STACK
- BUILDING AIR INTAKE LOCATION 10-FOOT RADIUS

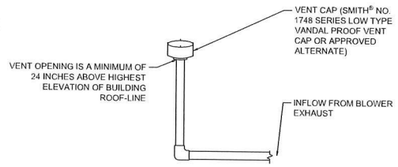


NOTE: THIS DETAIL DOES NOT SHOW THE SOUND ENCLOSURE BOX.

5 H-105 TYPICAL BLOWER LAYOUT (PLAN VIEW)
SCALE: N.T.S.



6 H-105 TYPICAL BLOWER LAYOUT (SECTION VIEW)
SCALE: N.T.S.



7 H-105 TYPICAL EXHAUST POINT
SCALE: N.T.S.

GENERAL NOTES:

1. ALL LOCATIONS ARE APPROXIMATE
2. NOT ALL REQUIRED ACCESSORIES ARE SHOWN.
3. BACKGROUNDS ADAPTED FROM 100% CD SUBMISSION SET, OVERALL FLOOR PLAN - LEVEL 10, A-104.00, OVERALL FLOOR PLAN - LEVEL 12, A-106.00, OVERALL FLOOR PLAN - ROOF, A-107.00, DATED APRIL 02, 2024, PROVIDED BY S9 ARCHITECTURE.
4. PIPE AND EQUIPMENT ARRANGEMENT SHOWN FOR SCHEMATIC PURPOSES ONLY (NOT TO SCALE). CONTRACTOR TO SUBMIT TO-SCALE DRAWING SHOWING PROPOSED ARRANGEMENT. CONTRACTOR IS REQUIRED TO OBTAIN APPROVAL OF ARRANGEMENT.
5. PROVIDE SHOP DRAWINGS FOR BLOWER AND ACCESSORY LAYOUT AND EXHAUST STACK MOUNTING.
6. EXTENSION OF THE SMDS PIPING MUST BE COORDINATED WITH STRUCTURAL ENGINEERS AND ARCHITECTS IN ACCORDANCE WITH ALL APPLICABLE BUILDING CODES
7. PROVIDE LIGHTNING ROD AND GROUNDING WIRE AS PER ELECTRICAL REQUIREMENTS, ELECTRICAL WIRING AND EQUIPMENT NOT SHOWN. REFER TO ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR REQUIREMENTS.
4. EXHAUST STACK CONFIGURATION, HEIGHT, AND STRUCTURAL SUPPORT WILL BE DESIGNED BY OTHERS, IF NECESSARY.
5. EXHAUST STACK MUST BE A MINIMUM OF 2 FEET ABOVE THE FINISHED ROOF FLOOR, MINIMUM 10 FEET ABOVE GROUND LEVEL, MINIMUM 10 FEET AWAY FROM ANY OPENING THAT IS LESS THAN 2 FEET BELOW THE EXHAUST POINT, AND MINIMUM 10 FEET FROM ADJOINING OR ADJACENT BUILDINGS, OPERABLE WINDOWS, HEATING VENTILATION AND AIR CONDITIONING (HVAC) INTAKES, SUPPLY REGISTERS , OR ANY OTHER INLETS.
6. INSTALL RAIN GUARD OR CAP ON THE EXHAUST POINT.

FAN NOTES:

1. THE SUCTION FAN SCHEMATICS AND DETAILS ARE SHOWN TO ILLUSTRATE THE REQUIRED COMPONENTS AND THE GENERAL LOCATIONS IN THE PIPING RUN AND SHALL NOT BE CONSIDERED ACCURATE. THE ACTUAL CONFIGURATION AND DIMENSIONS OF THE SUCTION FAN ASSEMBLY WILL VARY BASED ON MANUFACTURING METHODS AND FIELD CONDITIONS. FINAL DESIGN AND SUCTION FAN SYSTEM SELECTED SHALL BE DETAILED IN SUBMISSIONS TO THE ENGINEER AND ARE SUBJECT TO APPROVAL. CONTRACTOR SHALL PROVIDE ALL SUCTION FAN SPECIFICATIONS AND CUT SHEETS TO THE ENGINEER FOR APPROVAL PRIOR TO INSTALLATION.
2. BLOWERS MUST BE EXPLOSION PROOF AND HOUSED IN A CLASS I DIVISION II ENCLOSURE. BLOWERS MUST BE INSTALLED WITHIN THE ENCLOSURE BY THE BLOWER MANUFACTURER.
3. CONTRACTOR TO PROVIDE CONNECTION TO GROUNDING FOR ROOFTOP FAN. CONTRACTOR TO PROVIDE SOUND ENCLOSURE IF REQUIRED TO MEET NEW YORK CITY NOISE CODE AND/OR FURTHER ATTENUATE NOISE FOR NEARBY RESIDENTIAL UNITS. COORDINATE BLOWER SOUND AND/OR VIBRATION ATTENUATION REQUIREMENTS WITH ARCHITECT AND ACOUSTICAL CONSULTANT.
4. THE COMPOSITE BLOWER ASSEMBLY INCLUDING BLOWER, MOTOR, BASEPLATE, CONTROL PANEL, REMOTE VISUAL ALARM, VALVES, GAUGES, FILTER, AND FLEXIBLE HOSE SHALL BE PROVIDED BY THE MANUFACTURER.
5. BLOWER ASSEMBLY TO BE INSTALLED SHALL PROVIDE AT CONTINUOUS OPERATION OF A MINIMUM FLOW RATE AND VACUUM AT THE VACUUM BLOWER AS SPECIFIED IN THE FAN SCHEDULE.
6. THE BLOWER SCHEMATICS ARE SHOWN TO ILLUSTRATE THE REQUIRED COMPONENT AND THE GENERAL LOCATIONS IN THE PIPE RUN AND SHALL NOT BE CONSIDERED TO BE ACCURATE. THE ACTUAL CONFIGURATION AND DIMENSIONS OF THE BLOWER ASSEMBLY WILL VARY BASED ON MANUFACTURING METHODS AND FIELD CONDITIONS. FINAL DESIGN AND BLOWER SYSTEM SELECTED ARE SUBJECT TO APPROVAL BY THE ENGINEER. PROVIDE ALL BLOWER SPECIFICATIONS AND CUT SHEETS FOR COMMISSION AND/OR CONSTRUCTION MANAGER'S APPROVAL PRIOR TO INSTALLATION.
7. THE ELECTRICAL PANEL FOR THE BLOWERS SHALL INCLUDE AN AUXILIARY CONTACT FOR THE REMOTE ALARM AND WILL BE MOUNTED ON THE EXTERIOR OF THE SOUND ENCLOSURE. THE REMOTE ALARM SHALL BE LOCATED WITHIN THE BUILDING AND SHALL BE EASILY ACCESSIBLE. THE ALARM SHALL CONSIST OF A WARNING LIGHT AND ASSOCIATED RELAYS. THE REMOTE ALARM AND CONTROL PANEL SHALL BE CONFIGURED SUCH THAT IF THE BLOWER STOPS OPERATING, THE REMOTE ALARM WILL BE ACTIVATED. ALTERNATIVELY, IF A BUILDING MANAGEMENT SYSTEM IS TO BE INSTALLED, THE REMOTE ALARM WILL CAN BE CONFIGURED THROUGH THIS SYSTEM. A 120V ELECTRICAL SUPPLY SHALL BE PROVIDED TO THE REMOTE ALARM (REFER TO MEP DRAWINGS FOR DESIGN OF ELECTRICAL ITEMS).
8. THE REMOTE VISUAL ALARM SHALL BE LABELED AS FOLLOWS (REFER TO MEP DRAWINGS FOR DESIGN OF ELECTRICAL ITEMS):
   - SUB-SLAB VAPOR VENTING SYSTEM ALARM
   - BLOWER MALFUNCTION IF LIT
   - SERVICE BLOWER FAN IMMEDIATELY

FAN SCHEDULE

UNIT NO.	AREAS SERVED	SERVICE	LOCATION	MOTOR SIZE	MIN. CFM	MIN. RATE (INCHES WC)	MOTOR REQUIREMENTS			MANUFACTURER/MODEL
SF-1	WEST AREAS (FIRST FLOOR)	SMDS	10TH FLOOR ROOF WEST TOWER	1.11 HP(3.75/2.15 AMPS)	37	12.0000	3 PHASE	60 HZ	220-250/415-460 VOLTS	AIRTECH 3BA1310-7AT26
SF-2	SOUTH AREAS (FIRST FLOOR)	SMDS	ROOF OVER BULKHEAD B	0.39 HP(1.74/1.0 AMPS)	23	11.0000	3 PHASE	60 HZ	220-250/415-460 VOLTS	AIRTECH 3BA1300-7AT06
SF-3	SOUTH AREAS (FIRST FLOOR)	SMDS	ROOF OVER BULKHEAD A	0.39 HP(1.74/1.0 AMPS)	27	11.0000	3 PHASE	60 HZ	220-250/415-460 VOLTS	AIRTECH 3BA1300-7AT06
SF-4	EAST AREAS (FIRST FLOOR)	SMDS	10TH FLOOR ROOF EAST TOWER	1.11 HP(3.75/2.15 AMPS)	39	12.0000	3 PHASE	60 HZ	220-250/415-460 VOLTS	AIRTECH 3BA1310-7AT26

INSTRUMENT SCHEDULE

ITEM	DESCRIPTION	SERVICE	AREAS SERVICED	LOCATION	REQUIREMENTS	RANGE	REMARKS	MANUFACTURER/MODEL
PI-101	VACUUM GAUGE	SMDS	SYSTEMS 1 - 4	BLOWER INLET	N/A	SEE VACUUM GAUGE SCHEDULE	N/A	WIKA TYPE 611.10
AIS-1	ALARM INDICATOR STATION	SMDS	SYSTEMS 1 - 4	TO BE DETERMINED	1 PHASE, 60 HZ, 24 VAC	N/A	CONNECT TO PRESSURE SWITCH	KELE RAD-1
PS-101	DIFFERENTIAL PRESSURE SWITCH	AIS	SYSTEMS 1 - 4	BLOWER INLET	N/A	0.4-1.6" WC	CONNECT TO AIS FOR BLOWER ASSEMBLY	DWEYER INSTRUMENTS SERIES 1900, MODEL 1910-1
ENV VFD-1	VARIABLE FREQUENCY DRIVE	SMDS FAN	SYSTEMS 1 - 4	TO BE DETERMINED	3 PHASE, 60 HZ, 208 VAC	0-60 HZ	COORDINATE LOCATION WITH ARCHITECT	WEG EDP11S007DN3R10000
FAN SILENCER	SILENCER	SMDS FAN	SYSTEMS 1 - 4	TO BE DETERMINED	N/A	N/A	CONNECT TO FAN OUTLET	dB NOISE REDUCTION, 213-005086

DOB JOB NUMBER: B00917292-S9		
Date	Description	No.
12/19/2025	PW1 SUBMISSION	1

STATE OF NEW YORK · JASON JAMES HAYES · 098491 · LICENSED PROFESSIONAL ENGINEER
12/19/2025
SIGNATURE DATE SIGNED
JASON J. HAYES, P.E.
NEW YORK LICENSE NO. 098491

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Project
1709 SURF AVENUE
BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS NEW YORK

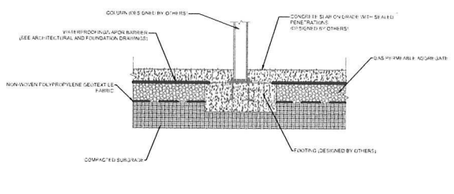
Drawing Title
SUB-MEMBRANE DEPRESSURIZATION SYSTEM BLOWER PLAN AND DETAILS

Project No.	Drawing No.
170747001	H-105.00
Date: 03/13/2025	
Drawn By: VK	
Checked By: LH	Sheet 7 of 9

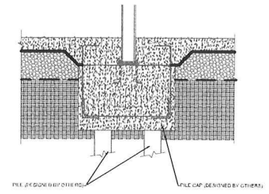
WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST. TO ALTER THIS ITEM IN ANY WAY.

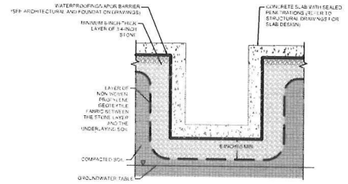
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Filename: \\Langan.com\data\NYC\data6\170747001\Project Data\CAD\01\SheetFiles\Environmental\SSDS Design - PAA\170747001- 1706 Surf Ave - SSDS.dwg Date: 12/10/2025 Time: 16:23 User: vkanagaratnam Style Table: Langan.stb Layout: H-105.00

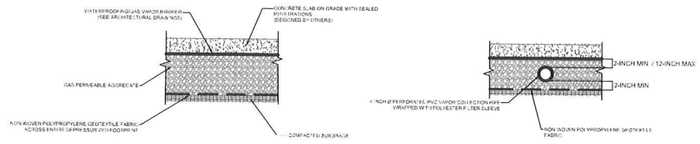


1 H-201 TYPICAL SECTION AT SUB-SLAB FOUNDATION ELEMENT
SCALE: N.T.S.

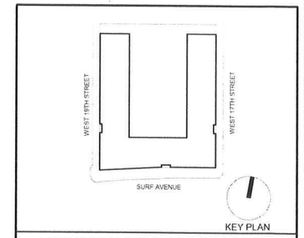




2 H-201 TYPICAL PIT IN DEPRESSURIZED AREA
SCALE: N.T.S.

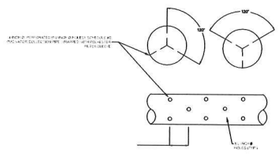


3 H-201 TYPICAL SECTION THROUGH SUB-SLAB
SCALE: N.T.S.

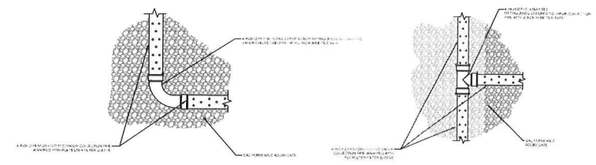


PROJECT LOCATION MAP
SCALE: NOT TO SCALE

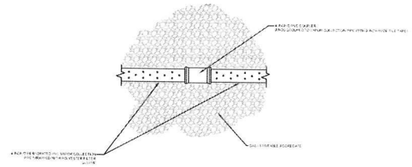
SOURCE:
CONEY ISLAND – PHASE 3 – 100%SD SUBMISSION



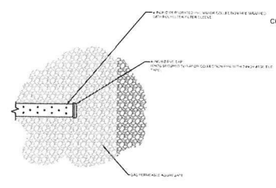
4 H-201 TYPICAL PERFORATION FOR VAPOR COLLECTION PIPE
SCALE: N.T.S.



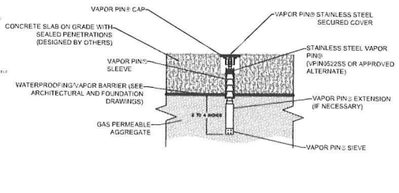
5 H-201 TYPICAL CONNECTOR FITTINGS FOR VAPOR COLLECTION PIPE
SCALE: N.T.S.



6 H-201 TYPICAL COUPLER FOR VAPOR COLLECTION PIPE
SCALE: N.T.S.

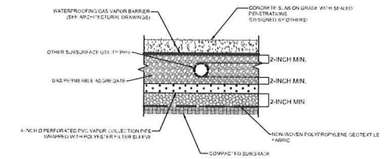


7 H-201 TYPICAL CAP TERMINATION FOR VAPOR COLLECTION PIPE
SCALE: N.T.S.



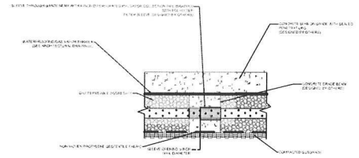
NOTE: TYPICAL CONSTRUCTION SHOWN IN THE DETAIL. CONTRACTOR MUST FOLLOW MANUFACTURER INSTRUCTIONS/MANUALS FOR ACTUAL CONSTRUCTION

8 H-201 TYPICAL MONITORING POINT
SCALE: N.T.S.



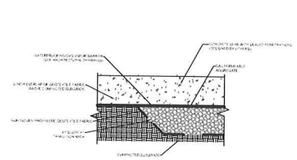
NOTE: ONLY APPLIES WHERE 4-INCH Ø PVC VAPOR COLLECTION PIPE DOES NOT FIT ABOVE UTILITY PIPE.

9 H-201 TYPICAL VAPOR COLLECTION PIPE CROSSING OTHER PIPE
SCALE: N.T.S.

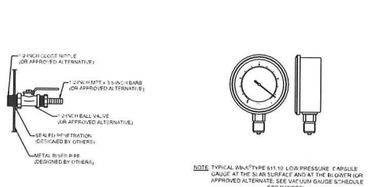


NOTE: COORDINATE PLACEMENT AND CONSTRUCTION OF SLEEVE THROUGH GRADE BEAM WITH STRUCTURAL ENGINEER.

10 H-201 TYPICAL SLEEVE THROUGH SUBSURFACE FOUNDATION ELEMENT
SCALE: N.T.S.

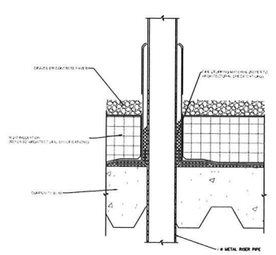


11 H-201 TYPICAL TRANSITION FROM DEPRESSURIZED AREA TO NON-DEPRESSURIZED AREA
SCALE: N.T.S.

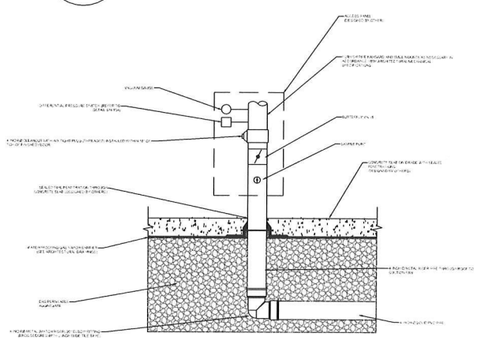


NOTE: TYPICAL WIKA TYPE 611.10 LOW PRESSURE CAPSULE GAUGE AT THE SLAB SURFACE AND AT THE BLOWER (OR APPROVED ALTERNATE. SEE VACUUM GAUGE SCHEDULE FOR RANGES).

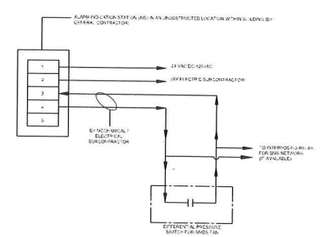
12 H-201 TYPICAL SAMPLE PORT AND VACUUM GAUGE
SCALE: N.T.S.



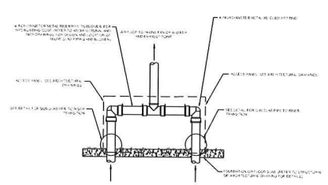
13 H-201 TYPICAL ROOF PENETRATION SUBSURFACE FOUNDATION ELEMENT
SCALE: N.T.S.



14 H-201 TYPICAL RISER SLAB PENETRATION
SCALE: N.T.S.



15 H-201 INTERCONNECTION SCHEMATIC OF DIFFERENTIAL PRESSURE SWITCH FOR SMDS FANS WITH AIS AND BMS NETWORK
SCALE: N.T.S.



16 H-201 TYPICAL RISER MANIFOLD
SCALE: N.T.S.

NOTES:

1. REFER TO DRAWINGS H-101.00 THROUGH H-105.00 FOR SMDS PIPING, RISER, GAS PERMEABLE AGGREGATE, AND FAN AND EXHAUST STACK LOCATIONS, DETAILS, AND SECTIONS.
2. A DIFFERENTIAL PRESSURE SWITCH SHALL BE INSTALLED ON THE RISER PIPE BEFORE THE SUCTION FAN. THE DIFFERENTIAL PRESSURE SWITCH SHALL BE CONNECTED TO THE ALARM INDICATOR SYSTEM (AIS).
3. BMS = BUILDING MANAGEMENT SYSTEM

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST. TO ALTER THIS ITEM IN ANY WAY.

DOB JOB NUMBER: B00917292-S9

Date	Description	No.
12/19/2025	DOB SUBMISSION	1

SIGNATURE: JASON J. HAYES, P.E. DATE SIGNED 12/19/2025
JASON J. HAYES, P.E.
NEW YORK LICENSE NO. 080949

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Project
1709 SURF AVENUE
BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS NEW YORK

Drawing Title
SUB-MEMBRANE DEPRESSURIZATION SYSTEM DETAILS

Project No.	Drawing No.
170747001	H-201.00
Date: 03/13/2025	
Drawn By: VK	
Checked By: LH	Sheet 8 of 9

LANGAN PROJECT NO. 170747001

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Filename: \\Langan.com\data\NYC\data0\170747001\Project Data\CAD\01\SheetFiles\Environmental\SSDS Design - PAA\170747001- 1706 Surf Ave - SSDS.dwg Date: 12/19/2025 Time: 16:24 User: vkanagaratnam Style Table: Langan.stb Layout: H-201.00

COMPLIANCE WITH NYCECC 2020

ITEM DESCRIPTION	CODE PRESCRIPTIVE VALUE & CITATION	PROPOSED DESIGN VALUE	SUPPORTING DOCUMENTATION
SUB-MEMBRANE DEPRESSURIZATION (SMD) SYSTEM	N/A	N/A	N/A

TO THE BEST OF MY KNOWLEDGE, BELIEF, AND PROFESSIONAL JUDGEMENT, ALL WORK UNDER THIS APPLICATION IS IN COMPLIANCE WITH 2020 NYCECC BY APPLICATION OF ASHRAE 90.1-2016 AS MODIFIED BY APPENDIX CA.

THE SUB-MEMBRANE DEPRESSURIZATION SYSTEM COMPLIES WITH THE REQUIREMENTS OF THE 2022 NYC MECHANICAL CODE SECTION 512, "SUBSLAB SOIL EXHAUST SYSTEMS" AND IS NOT SUBJECT TO THE ASHRAE 90.1, SECTION 6.5.3.1.1 REQUIREMENTS.

SUB-MEMBRANE DEPRESSURIZATION SYSTEMS ARE NOT ASSOCIATED WITH SYSTEMS PROVIDING HEATING OR COOLING CAPABILITY, AND DO NOT QUALIFY AS A REGULATED SYSTEM UNDER THE CRITERIA SET OUT PER ASHRAE 90.1, SECTION 6.5.3.1.1.

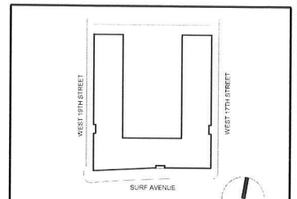
PER DEFINITION IN CODE SECTION 3.2 OF NEW YORK CITY ENERGY CODE 2020, SUB-MEMBRANE DEPRESSURIZATION SYSTEMS ARE CONSIDERED PROCESS ENERGY BECAUSE THEIR OPERATION SUPPORTS A PROCESS OTHER THAN CONDITIONING SPACES AND MAINTAINING COMFORT AND AMENITIES FOR THE BUILDING OCCUPANTS; SUB-MEMBRANE DEPRESSURIZATION SYSTEMS ARE THEREFORE NOT SUBJECT TO ASHRAE 90.1, SECTION 6.5.3.1.1 REQUIREMENTS.

ENERGY CODE PROGRESS INSPECTION

IID	INSPECTION/TEST	PERIODIC (MINIMUM)	REFERENCE STANDARD (SEE ECC CHAPTER C6) OR OTHER CRITERIA	ECC OR OTHER CITATION	INSPECTION DESCRIPTION
IDD1	MAINTENANCE INFORMATION	PRIOR TO SIGN-OFF OR ISSUANCE OF FINAL CERTIFICATE OF OCCUPANCY	APPROVED CONSTRUCTION DOCUMENTS, INCLUDING ELECTRICAL DRAWINGS WHERE APPLICABLE; ASHRAE GUIDELINE 4: PREPARATION OF OPERATING AND MAINTENANCE DOCUMENTATION FOR BUILDING SYSTEMS	ASHRAE 90.1 - 4.2.2.3, 6.7.2.2, 6.7.2.3.5.2, 8.7.2, 9.7.2.2, 9.4.3.2.2	MAINTENANCE MANUALS FOR MECHANICAL, SERVICE HOT WATER AND ELECTRICAL EQUIPMENT AND SYSTEMS REQUIRING PREVENTIVE MAINTENANCE MUST BE REVIEWED FOR APPLICABILITY TO INSTALLED EQUIPMENT AND SYSTEMS BEFORE SUCH MANUALS ARE PROVIDED TO THE OWNER. LABELS REQUIRED FOR SUCH EQUIPMENT OR SYSTEMS MUST BE INSPECTED FOR ACCURACY AND COMPLETENESS.

GENERAL NOTES

1. REFER TO THE ENERGY CODE SUBMISSIONS UNDER NEW BUILDING APPLICATION NO. B00917292-I1/S4/S5 FOR THE FULL ENERGY MODEL SUBMISSION FOR THE BUILDING.



PROJECT LOCATION MAP

SCALE: NOT TO SCALE

SOURCE:
CONEY ISLAND – PHASE 3 – 100%CD SUBMISSION

LANGAN

PROJECT NO. 170747001

DOB JOB NUMBER: B00917292-S9

Date	Description	No.
12/19/2025	DOB SUBMISSION	1
	REVISION	

STATE OF NEW YORK * JASON JAMES HAYES * LICENSED PROFESSIONAL ENGINEER

SIGNATURE JASON J. HAYES, P.E. DATE SIGNED 12/15/2025
NEW YORK LICENSE NO. 089454

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Project

1709 SURF AVENUE

BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS NEW YORK

Drawing Title

ENERGY CODE COMPLIANCE

Project No.	Drawing No.
170747001	EN-001.00
Date: 03/13/2025	
Drawn By: VK	
Checked By: LH	Sheet 9 of 9

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST. TO ALTER THIS ITEM IN ANY WAY.

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Filename: \\Langan.com\data\NYC\data0\170747001\Project Data\CAD\01\SheetFiles\Environmental\SSDS Design - PAA\170747001- 1709 Surf Ave - SSDS.dwg Date: 12/10/2025 Time: 16:14 User: vkanagaratnam Style Table: Langan.stb Layout: EN-001.00

To: Surf Ave Construction Team
Re: 1709 Surf Ave – Brooklyn, NY – Aussie Skin 550G
Date: August 19, 2025

To Whom it May Concern,

This letter is confirmation that AVM Technical Services has reviewed the August 14, 2024 Remedial Investigation Report for the 1709 Surf Ave project in Brooklyn, NY. Based on the data, the Aussie Skin 550G far exceeds and is approved for the level of VOC's listed in the report. The Aussie Skin 550G is a fully bonded system that acts as a waterproofing membrane as well as an excellent vapor barrier product.

For any further assistance or information, please reach out to the New York AVM Sales Director, Vince Caserta at (646) 946-9717 or a Technical Services Representative.

Best regards,

James Glade

James Glade
Technical Services Representative
AVM Industries, Inc.

ANGKOR GROUP
GENERAL CONTR

Socotec General Review Comments:
- Reviewed for Below Grade Waterproofing scope only
- All comments to be considered typical unless noted otherwise
- Dimensions, tolerances, quantities, and locations, not reviewed by Socotec
- Flash/seal all penetrations/fasteners through waterproofing membrane materials
- Follow below grade waterproofing manufacturer's recommendations for substrate preparation and waterproofing product application
- CM/GC to confirm and coordinate all work scope indicated / called out as "By Others"
- Structural engineer to confirm use of continuous liquid waterproofing over tops of pile caps, grade beams, etc as shown

Waterproofing Detail

1709 SURF AVE,
BROOKLYN, NY 11224

NOT PROVIDED - SOCOTEC 8/8/25 REVIEW OF RESPONSES

KEY

Inside Corner
0550G 0560G-6210

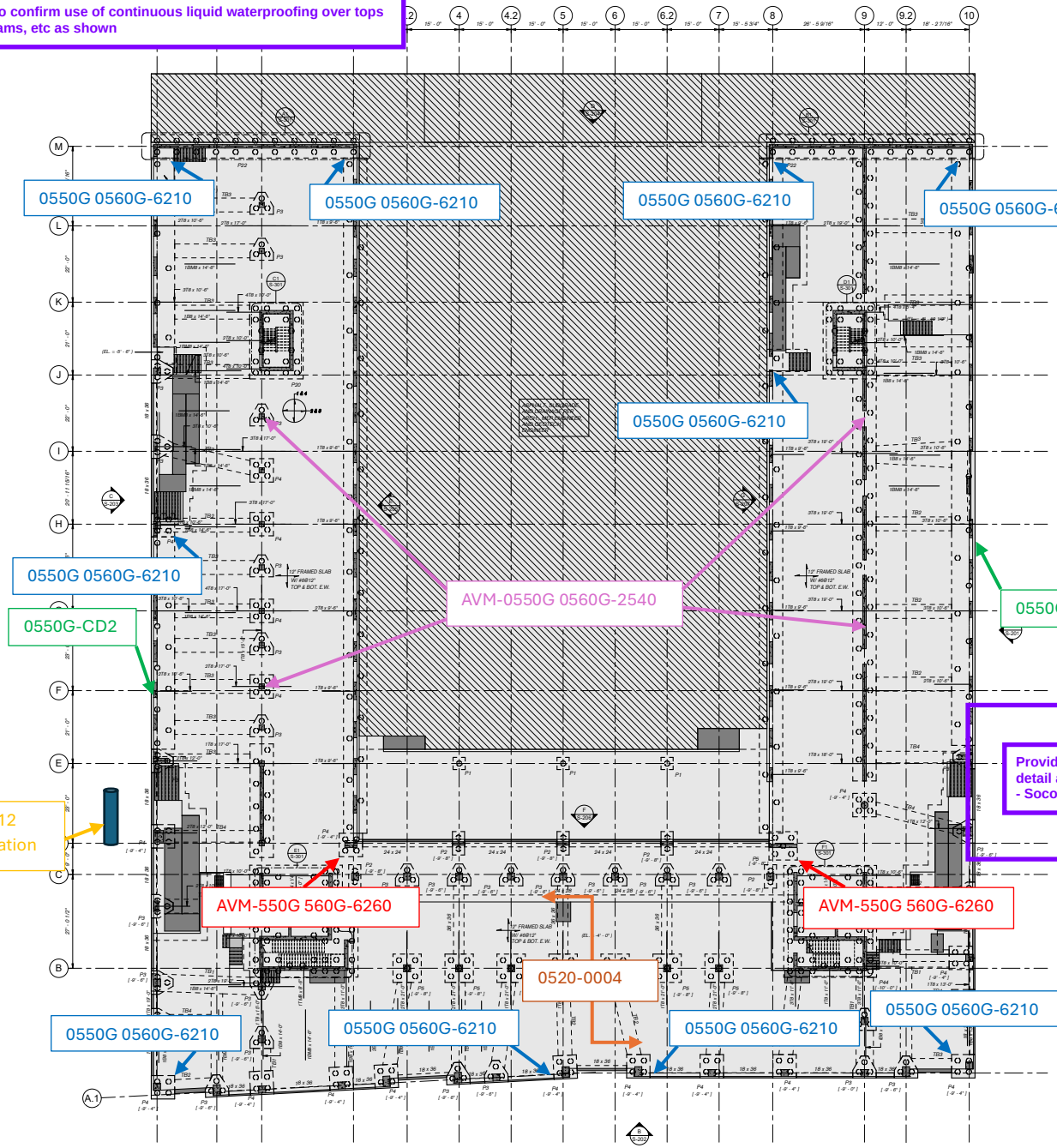
Over Grade-Beam
AVM-0550G 0560G-2540

Outside Corner
AVM-550G 560G-6260

Field
0520-0004

Over Footing Transition
0550G-CD2

Pipe Penetration
0550- 6512



FOUNDATION AND GROUND FLOOR FRAMING PLAN
3/32" = 1'-0"

Provide waterproofing section detail at elevator pit(s) - Socotec

NOT PROVIDED - SUBMIT PIT DETAIL - SOCOTEC 8/8/25 REVIEW OF RESPONSES

S9: SEE ENGINEERS COMMENTS THROUGHOUT

☒ APPROVED ☐ REVISE AND RESUBMIT
☐ APPROVED AS NOTED ☐ FOR RECORD ONLY

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BRIGHT POWER INC.

REVIEWED BY: JohnDube DATE: 08/08/2025
EQUIPMENT TAG(S): 1709 Surf Ave BK - AVM_BP_SOC_S9 - responses to comments

Spec Section: 07	Project Name: CONEY ISLAND III
Project No.: 66469.00	Subm. No.: 071326-4
S9 Architecture & Engineering, DPC	
Corrections or comments made on the shop drawings during this review do not relieve contractor from compliance with requirements of the drawings and specifications. This check is only for review of general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating the work with that of all other trades; and performing the work in a safe and satisfactory manner.	☐ no exceptions taken ☐ make corrections noted ☑ revise and resubmit ☐ rejected ☐ no action taken
by: c.kroll	date: 7/16/2025

SHOP DRAWING / SUBMITTAL REVIEW — SOCOTEC

PROJECT: 1709 Surf Ave - Coney Island III SUBMISSION NO.: 071326-05-01

☒ REVIEWED FOR FOLLOWING SCOPE:

☐ FACADE	BY:	DATE:
☒ ROOFING & WATERPROOFING	BY: W. Callahan	DATE: 08/08/2025
☐ SUSTAINABILITY	BY:	DATE:

☐ NOT REVIEWED

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SUBMITTAL IS REVIEWED ONLY AS TO GENERAL CONFORMITY WITH DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. CORRECTIONS AND/OR COMMENTS MADE AS PART OF THIS SUBMITTAL REVIEW DO NOT RELIEVE CONTRACTOR OF RESPONSIBILITY FROM CONFORMANCE WITH THE CONTRACT DOCUMENTS, APPLICABLE CODES, AND LAWS – ALL OF WHICH HAVE PRIORITY OVER THIS SUBMITTAL. THE DESIGN PROFESSIONAL DOES NOT WARRANT OR REPRESENT THAT THE INFORMATION WITHIN THE SUBMITTAL IS EITHER ACCURATE OR COMPLETE. SOLE RESPONSIBILITY FOR CORRECT DESIGN, DETAILS AND DIMENSIONS SHALL REMAIN WITH THE PARTY PROVIDING THE SUBMITTAL. CONTRACTOR IS RESPONSIBLE FOR ALL DIMENSIONS, QUANTITIES AND PERFORMACE REQUIREMENTS TO BE CONFIRMED AND CORRELATED AT THE JOB SITE; FOR ALL INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESSES OR TO TECHNIQUES OF CONSTRUCTION; FOR ALL COORDINATION OF THE WORK OF ALL TRADES; FOR ASSURING CONSISTENCY WITH THE CONTRACT DOCUMENTS; AND FOR PERFORMING THE WORK ON A SAFE AND SATISFACTORY MANNER.

BRIGHT POWER INC.

REVIEWED BY: RyanTandy DATE: 08/13/2025
EQUIPMENT TAG(S): 1709 Surf Ave, Bk - AVM_BP

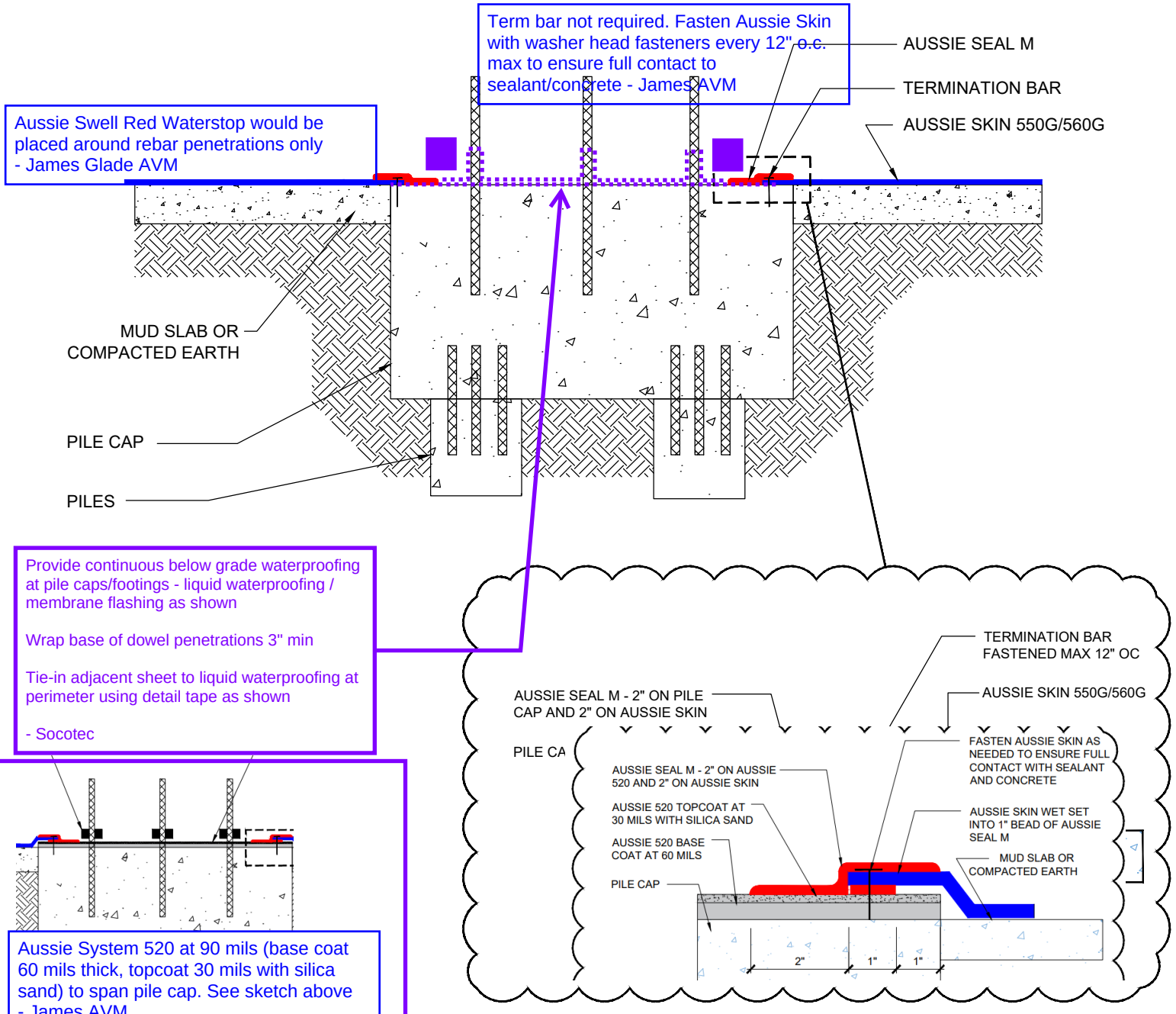
DETAIL #:
AVM-0550G_0560G-2630

AVM System 550G/560G
ANGKOR CORP

1709 Surf Ave

Pile Cap Detail - Non-Hydrostatic

AVM INDUSTRIES INC



Notes:

1. Aussie Skin 550G and 560G are Heavy Duty, Easy to Install, Puncture Resistant Sheet Waterproofing Membranes with added technologies creating excellent adhesion between the membrane and wet Concrete or Shotcrete. Aussie Skin 560G is an approved methane/VOC barrier.

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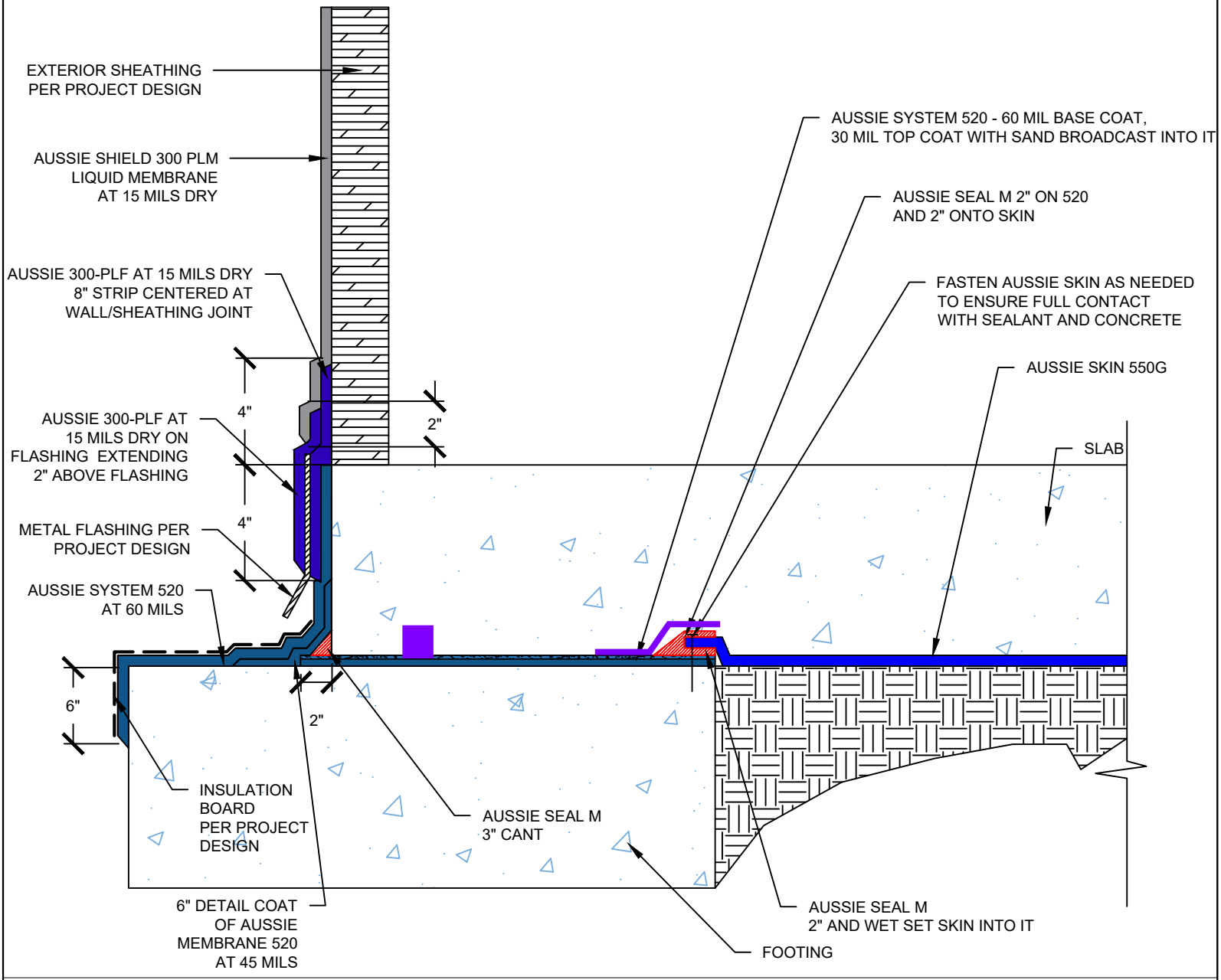
DETAIL #:
0550G-CD2

Project Name:
Surf Avenue

520 Over Footing Transition to Air Barrier

Aussie Skin 550G

AVM INDUSTRIES INC



Notes:

1. Aussie Skin 550G is a Heavy, Duty, Easy to Install, Puncture Resistant Sheet Waterproofing Membrane with added technologies creating excellent adhesion between the membrane and wet Concrete or Shot-Crete. Creating excellent adhesion between the membrane and wet Concrete or Shot-Crete.
2. All surfaces must be clean and sound before installing the lap joints. (Remove excess sand before applying double sided tape)
3. Epoxy Primer may be required if proper adhesion is not achieved.

AVM Industries, Inc.
8245 Remmet Ave, Canoga Park, CA 91304

Quality Waterproofing Products

888.414.1041 818.888.0050
www.avmindustries.com

FILE NAME: 0550G-CD1

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DETAIL #:
0550G_0560G-6210
Aussie Skin 550G_560G
ANGKOR CORP

1709 Surf Ave

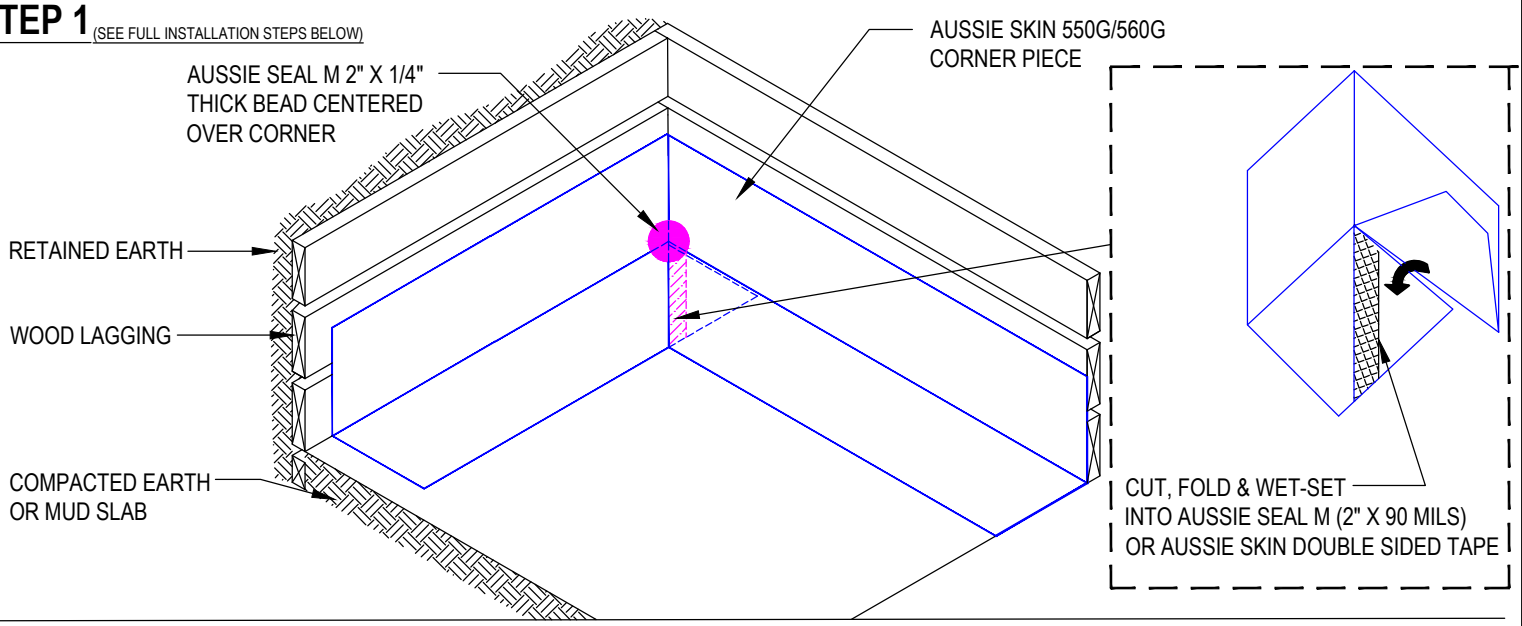
Inside Corner

Aussie Skin 550G/560G

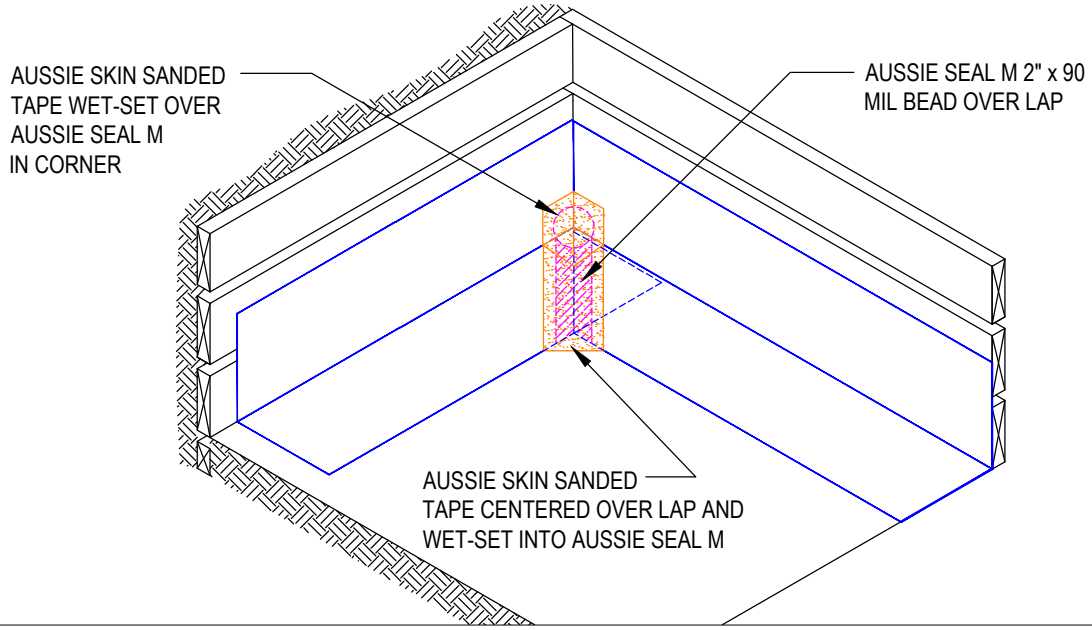
Submit all below grade waterproofing products and accessories as part of full system package for use on project including tapes, sealants/mastics, etc
- Socotec

AVM INDUSTRIES INC

STEP 1 (SEE FULL INSTALLATION STEPS BELOW)



STEP 2



Installation Steps:

1. Install Aussie Skin corner sheet and relief cut at corner as show
2. Place a 2" wide tooled bead of Aussie Seal M under 45° cut and wet-set Aussie Skin lap
3. Place a 2" x 1/4" thick tooled bead of Aussie Seal M centered at corner
4. Wet-set a piece of Aussie Skin Sanded Tape over 2" sealant in corner (relief cut sanded tape as needed to fit in corner)
5. Place a 2" x 90 mil tooled bead of Aussie Seal M over lap
6. Wet-set a piece of Aussie Skin Sanded Tape centered over the lap & Aussie Seal M and roll into place
7. Follow standard factory and/or non-factory lapping details for installation of Aussie Skin horizontal and vertical field sheets

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DETAIL #:
0550G/0560G - 8004
System:
Aussie Skin 550G/560G

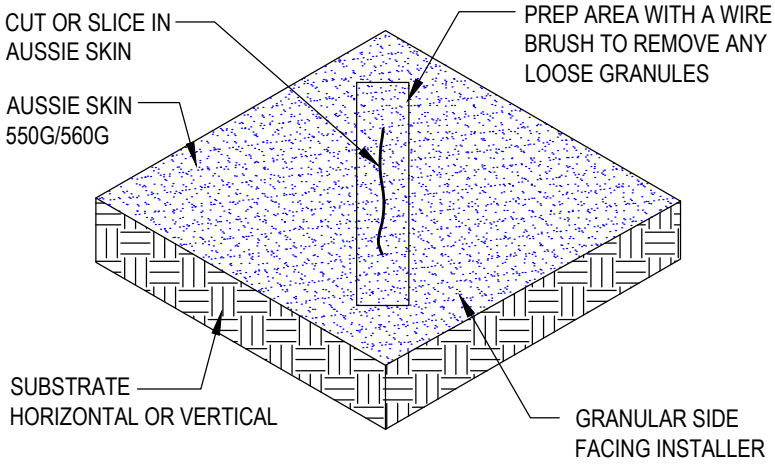
ANGKOR CORP
1709 Surf Ave

Repair Procedure for Cuts, Slices, and Small Punctures

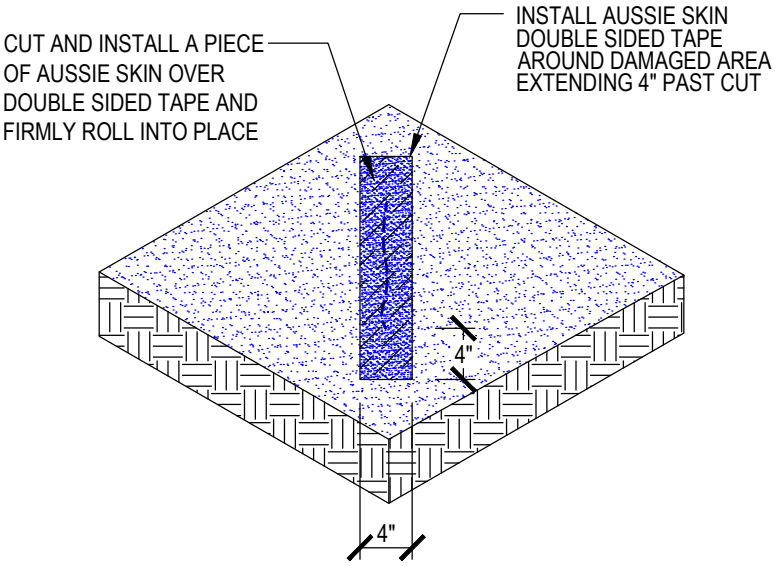
Aussie Skin 550G/560G

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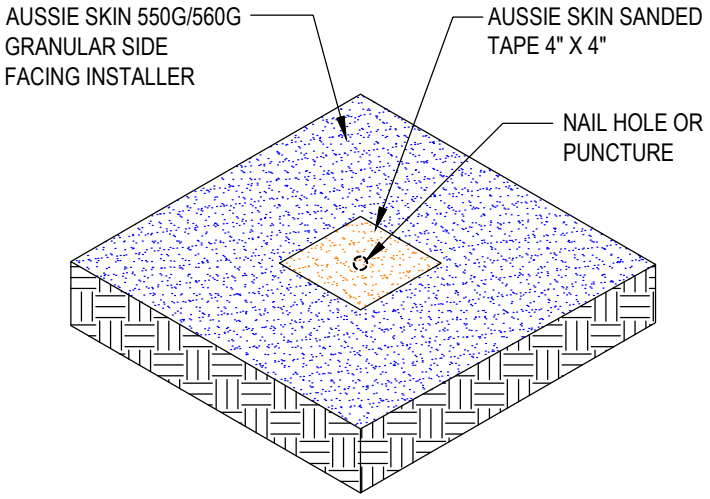
CUTS & SLICES - STEP 1



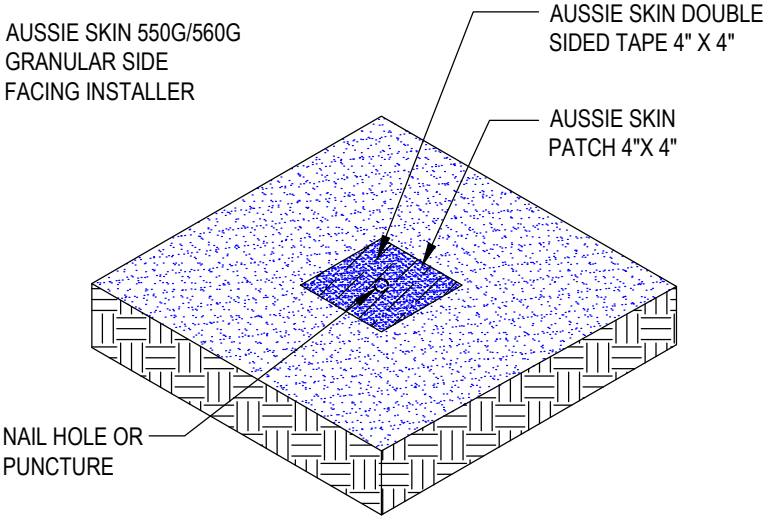
CUTS & SLICES - STEP 2



PUNCTURES - NON-WATER TABLE



PUNCTURES - WATER TABLE OR UNDER-SLAB



Notes:

1. Aussie Skin 550G and 560G are Heavy Duty, Easy to Install, Puncture Resistant Sheet Waterproofing Membranes with added technologies creating excellent adhesion between the membrane and wet Concrete or Shotcrete. Aussie Skin 560G is an approved methane/VOC barrier.

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DETAIL #:
AVM-550G_560G-6260

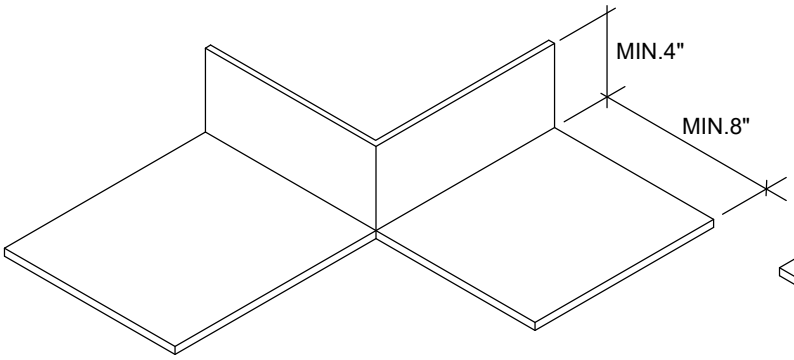
AVM System 550G_560G
ANGKOR CORP

1709 Surf Ave

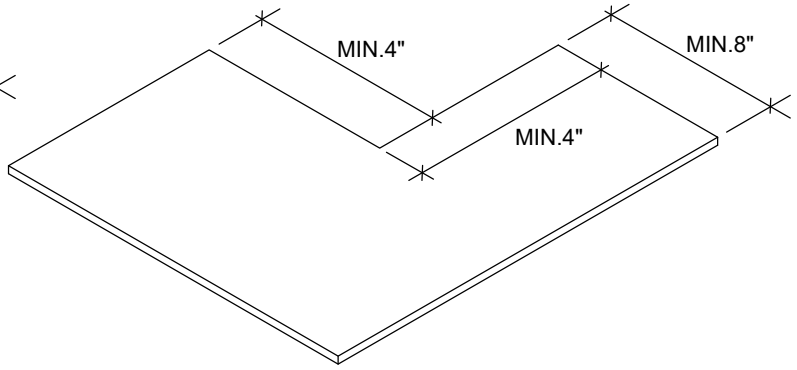
Outside Corner Detail - at Bottom of Wall

AVM INDUSTRIES INC

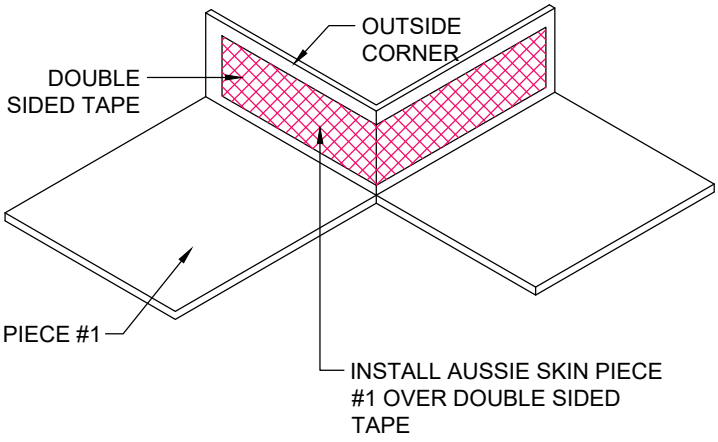
PIECE #1



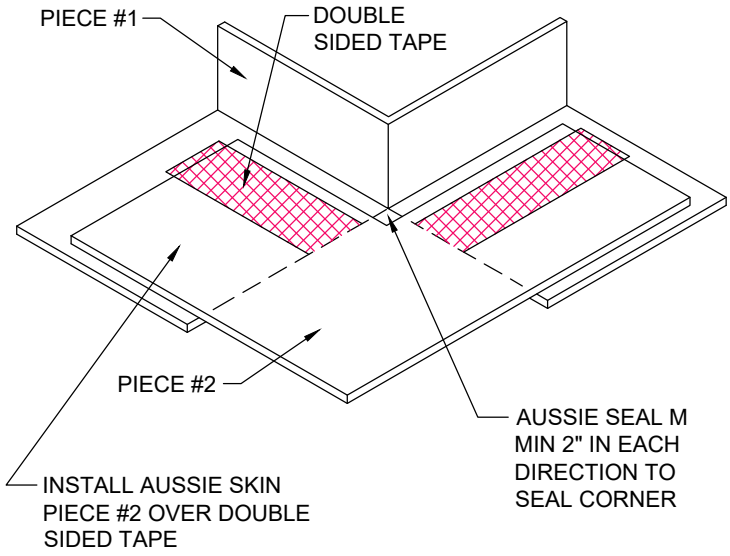
PIECE #2



STEP 1



STEP 2



Notes:

1. Aussie Skin 550G and 560G are Heavy Duty, Easy to Install, Puncture Resistant Sheet Waterproofing Membranes with added technologies creating excellent adhesion between the membrane and wet Concrete or Shotcrete. Aussie Skin 560G is an approved methane/VOC barrier.

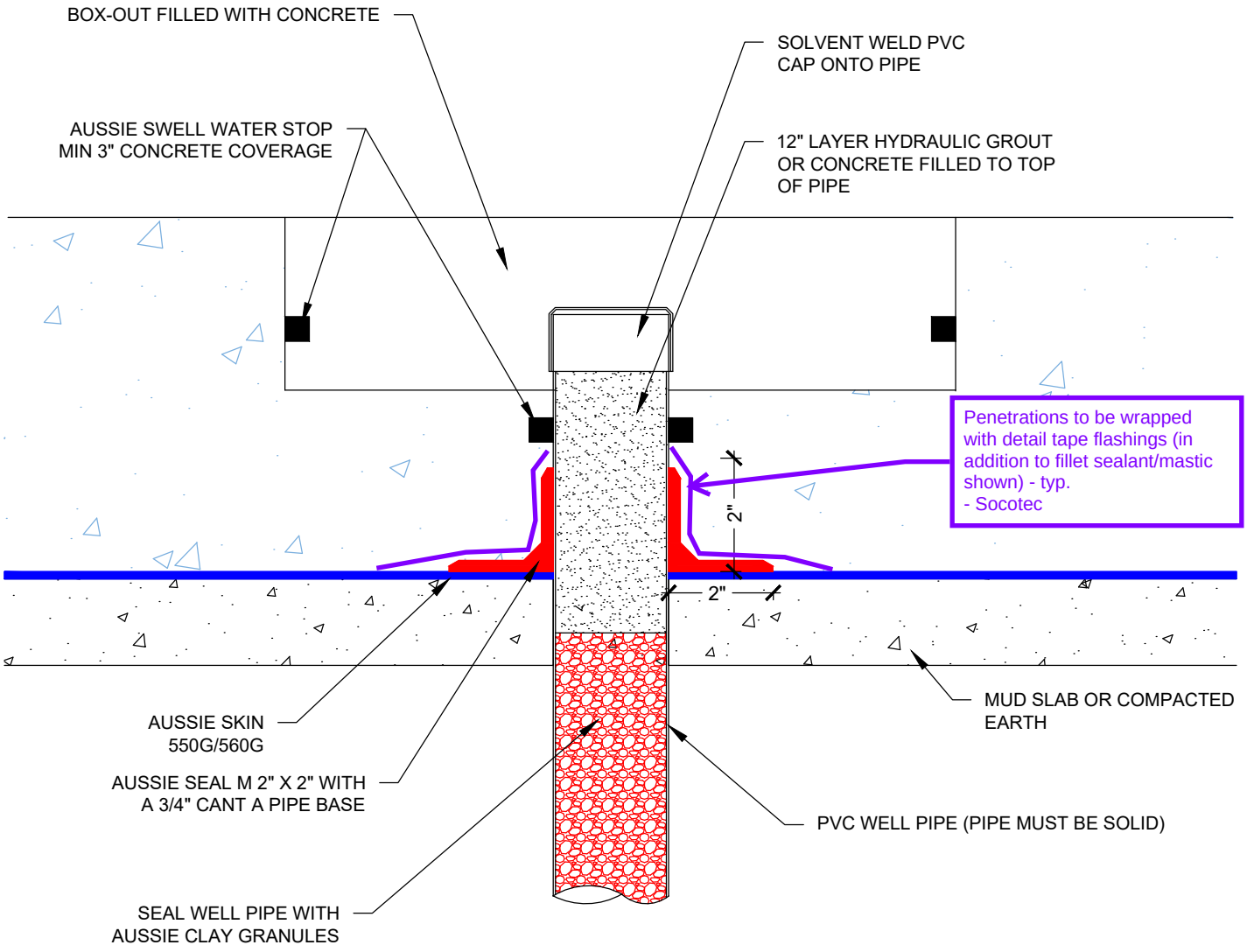
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DETAIL #:
AVM-0550G_0560G-2806

AVM System 550G/560G

Foundation Slab Well Pipe Sealing Box-out

AVM INDUSTRIES INC



NOTES:

1. Aussie Skin 550G and 560G are Heavy Duty, Easy to Install, Puncture Resistant Sheet Waterproofing Membranes with added technologies creating excellent adhesion between the membrane and wet Concrete or Shotcrete. Aussie Skin 560G is an approved methane/VOC barrier.

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Quality Waterproofing Products

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FILE NAME: 0550G_0560G-2806

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APPENDIX H

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN

for

1709 SURF AVENUE
BROOKLYN, NEW YORK

Prepared For:

Coney Island Associates Phase 3 LLC
c/o BFC Partners
150 Myrtle Avenue, Suite 2
Brooklyn, New York 11201

Prepared By:

Langan Engineering, Environmental, Surveying,
Landscape Architecture and Geology, D.P.C.
360 West 31st Street, 8th Floor
New York, New York 10001

July 2025
Langan Project No. 170747001

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ATTACHMENTS

Attachment A Résumés
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Attachment C Analytical Methods and Quality Assurance Summary Table
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Attachment E PFAS Sampling Standard Operating Procedure

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

This Quality Assurance Project Plan (QAPP) was prepared on behalf of Coney Island Associates Phase 3 LLC, the Volunteer, for the proposed development located at 1709 Surf Avenue (Kings County Tax Block 7061, Lots 16, 20, 21, 27 and a portion of Lot 14) in the Coney Island neighborhood of Brooklyn, New York (the site). This QAPP supports the Site Management Plan (SMP), which provides additional site information and data collected previously by Langan and others.

This QAPP specifies the sampling procedures to be followed and the analytical methods to be used to ensure that data from the SMP site activities are precise, accurate, representative, comparable, and complete.

1.2 PROJECT OBJECTIVES

Soil vapor and effluent air samples will be collected following on a regular basis as described in the SMP. Future site renovations and improvements or new construction requiring the disturbance, excavation, and/or off-site removal of soil, vapor, or groundwater may warrant the collection and analysis of soil, vapor, and groundwater samples in accordance with NYSDEC Divisions of Environmental Remediation (DER)-10: Technical Guidance for Site Investigation and Remediation. In addition, soil vapor and/or air sampling may be required as a condition for discontinuation of the SMD system. Accordingly, this QAPP addresses sampling and analytical methods that may be necessary in support of future improvements or proposed modifications to the SMP. These objectives have been established to meet standards that will protect public health and the environment for the Site.

1.3 SCOPE OF WORK

The specific scope of work covered in this QAPP includes any future intrusive work at the site that may be conducted and any site activities covered under the SMP. The SMP governs future activities relative to the site which may include groundwater, indoor air or vapor sampling. Indoor air sampling will be conducted annually during the heating period and at the request of NYSDEC/NYSDOH, in accordance with the NYSDOH October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York and subsequent updates (through 2017).

2.0 DATA QUALITY OBJECTIVES AND PROCESS

Data Quality Objectives (DQO) are qualitative and quantitative statements to help ensure that data of known and appropriate quality are obtained during the project. The overall objective is to prevent additional environmental impacts to site media (soil and groundwater).

The DQO process is an iterative process where various options for implementing a project are explored, dissected, and recombined. The feasibility and costs of various options are estimated, and then the most advantageous option is selected and developed into project work plans that will be implemented.

DQOs for sampling activities are determined by evaluating five factors:

- Data needs and uses: The types of data required and how the data will be used after it is obtained.
- Parameters of Interest: The types of chemical or physical parameters required for the intended use.
- Level of Concern: Levels of constituents, which may require remedial actions or further investigations, based on comparison to Title 6 of the Official Compilation of New York Codes, Rules and Regulations Part 375 NYSDEC UU SCOs for soil samples and to the October 2006 (updated in May 2017) New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York Air Guideline Values and Decision Matrices for soil vapor samples.
- Required Analytical Level: The level of data quality, data precision, and quality assurance (QA)/ quality control (QC) documentation required for chemical analysis.
- Required Detection Limits: The detection limits necessary based on the above information.

The investigation will be evaluated using the DQO process on an individual, task-specific basis. DQOs and the required level of review will be determined during this process.

The quality assurance and quality control objectives for all measurement data include:

- **Precision** – an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Field sampling precision will be determined by analyzing field duplicate samples and analytical precision will be determined by analyzing laboratory duplicates, laboratory control sample duplicates, and/or matrix spike duplicates.
- **Accuracy** – a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern. For soil and groundwater samples, accuracy will be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy will be assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic

analyses only), internal standards, laboratory method blanks, instrument calibration, and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks. For soil vapor or air samples, analytical accuracy will be assessed by examining the percent recoveries that are added to each sample, internal standards, laboratory method blanks, and instrument calibration.

- **Representativeness** – expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is dependent upon the adequate design of the sampling program and will be satisfied by ensuring that the scope of work is followed and that specified sampling and analysis techniques are used. Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical methods, meeting sample holding times, and maintaining sample integrity while the samples are in the laboratory's possession. This is accomplished by following all applicable methods, laboratory-issued standard operating procedures (SOP), the laboratory's Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.
- **Completeness** – the percentage of measurements made which are judged to be valid. Completeness will be assessed through data validation. The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested.
- **Comparability** – expresses the degree of confidence with which one data set can be compared to another. The comparability of all data collected for this project will be ensured using several procedures, including standard methods for sampling and analysis as documented in this QAPP, instrument calibrations, using standard reporting units and reporting formats, and data validation.
- **Sensitivity** – the ability of the instrument or method to detect target analytes at the levels of interest. The project manager will select, with input from the laboratory and QA personnel, sampling and analytical procedures that achieve the required levels of detection.

The above objectives are discussed in detail in Section 4.0.

3.0 PROJECT ORGANIZATION

Excavation activities will be overseen by Langan on behalf of the Volunteer. Langan will perform the sampling collection as described in the RAWP and will subcontract excavation and analytical services. Langan will also arrange data analysis and reporting tasks. The analytical services will be performed by Alpha Analytical Laboratories, Inc. of Westborough, Massachusetts (NYSDOH ELAP certification number 11148). Data validation services will be performed by Joe Conboy of Langan. Résumé are included in Attachment A.

Key contacts for this project are as follows:

Coney Island Associates Phase 3 LLC	Mr. Donald Cappocia Telephone: (718) 422-9999
Remediation Engineer (RE):	Mr. Jason Hayes, P.E., LEED AP Telephone: (212) 479-5427
Program Manager:	Mr. Brian Gochenaur, QEP Telephone: (212) 479-5479
Project Manager:	Ms. Lamees Esmail, P.E. Telephone: (212) 479-5717
Langan Health & Safety Officer:	Mr. Tony Moffa, ASP, CHMM, CSP, COSS Telephone: (215) 491-6545
Langan Site Safety Coordinator:	Mr. William Bohrer, P.G. Telephone: (212) 479-5533
Qualified Environmental Professional (QEP):	Mr. Michael Burke, PG, CHMM Telephone: (212) 479-5413
Field Team Leader:	Ms. Meghan Aronica, E.I.T Telephone: (212) 479-5680
Quality Assurance Officer:	Mrs. Marla Miller, P.E. Telephone: (602) 790-6052
Data Validator:	Mr. Joe Conboy Telephone: (609) 282-8055
Laboratory Representative	Mr. Ben Rao Telephone: (201) 812-2633

4.0 QUALITY ASSURANCE OBJECTIVES FOR COLLECTION OF DATA

The overall quality assurance objective is to develop and implement procedures for sampling, laboratory analysis, field measurements, and reporting that will provide data of sufficient quality to evaluate the engineering controls on the site. The sample set, chemical analysis results, and interpretations must be based on data that meet or exceed quality assurance objectives established for the site. Quality assurance objectives are usually expressed in terms of accuracy or bias, sensitivity, completeness, representativeness, comparability, and sensitivity of analysis. Variances from the quality assurance objectives at any stage of the investigation will result in the implementation of appropriate corrective measures and an assessment of the impact of corrective measures on the usability of the data.

4.1 PRECISION

Precision is a measure of the degree to which two or more measurements are in agreement. Field precision is assessed through the collection and measurement of field duplicates. Laboratory precision and sample heterogeneity also contribute to the uncertainty of field duplicate measurements. This uncertainty is taken into account during the data assessment process. For field duplicates, results less than 5x the reporting limit (RL) meet the precision criteria if the absolute difference is less than ±2x the RL for soils (and +1x the RL for water) and acceptable based on professional judgement. For results greater than 2x the RL for soils (and 1x the RL for water), the acceptance criteria is a relative percent difference (RPD) of ≤50% (soil), <30% (water and air). RLs and method detection limits (MDL) are provided in Attachment B.

Laboratory precision is assessed through the analysis of matrix spike/matrix spike duplicates (MS/MSD), laboratory control sample/laboratory control sample duplicates (LCS/LCSD) and subsequent calculation of RPD. For outliers, if additional sample volume is present, the MS/MSD should be reanalyzed and the RPD recomputed. If additional volume is not present, an evaluation will be performed to determine the extent of potential matrix interference.

4.2 ACCURACY

Accuracy is the measurement of the reproducibility of the sampling and analytical methodology. It should be noted that precise data may not be accurate data. For the purpose of this QAPP, bias is defined as the constant or systematic distortion of a measurement process, which manifests itself as a persistent positive or negative deviation from the known or true value. This may be due to (but not limited to) improper sample collection, sample matrix, poorly calibrated analytical or sampling equipment, or limitations or errors in analytical methods and techniques.

Accuracy in the field is assessed through the use of field blanks and through compliance with all sample handling, preservation, and holding time requirements. All field blanks should be non-detect when analyzed by the laboratory. Any contaminant detected in an associated field blank

will be evaluated against laboratory blanks (preparation or method) and evaluated against field samples collected on the same day to determine potential for bias. Trip blanks are not required for non-aqueous matrices, but will be considered for non-aqueous matrices where high concentrations of volatile organic compounds (VOC) are anticipated based on field screening.

Laboratory accuracy is assessed by evaluating the percent recoveries of MS/MSD samples, laboratory control sample/laboratory control sample duplicates (LCS/LCSD), surrogate compound recoveries, internal standard area counts, initial and continuing calibration, and the results of method, initial and continuing calibration blanks. MS/MSD, LCS/LCSD, and surrogate percent recoveries will be compared to either method-specific control limits or laboratory-derived control limits. Sample volume permitting, samples displaying outliers should be reanalyzed. All associated method blanks should be non-detect when analyzed by the laboratory.

4.3 COMPLETENESS

Laboratory completeness is the ratio of total number of samples analyzed and verified as acceptable compared to the number of samples submitted to the fixed-base laboratory for analysis, expressed as a percent. Three measures of completeness are defined:

- Sampling completeness, defined as the number of valid samples collected relative to the number of samples planned for collection;
- Analytical completeness, defined as the number of valid sample measurements relative to the number of valid samples collected; and
- Overall completeness, defined as the number of valid sample measurements relative to the number of samples planned for collection.

Soil, groundwater, and soil vapor data will meet a 90% completeness criterion. If the criterion is not met, sample results will be evaluated for trends in rejected and unusable data. The effect of unusable data required for a determination of compliance will also be evaluated.

4.4 REPRESENTATIVENESS

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. Representativeness is dependent upon the adequate design of the sampling program and will be satisfied by ensuring that the scope of work is followed and that specified sampling and analysis techniques are used. This is performed by following applicable SOPs and this QAPP. All field personnel will be given copies of appropriate documents prior to sampling events and are required to read, understand, and follow each document as it pertains to the tasks at hand.

Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical methods, meeting sample holding times, and maintaining sample integrity while the samples are

in the laboratory's possession. This is performed by following all applicable United States Environmental Protection Agency (USEPA) methods, laboratory-issued SOPs, the laboratory's Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.

4.5 COMPARABILITY

Comparability is an expression of the confidence with which one data set can be compared to another. Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the sampling plan is followed and that sampling is performed according to the SOPs or other project-specific procedures. Analytical data will be comparable when similar sampling and analytical methods are used as documented in the QAPP. Comparability will be controlled by requiring the use of specific nationally-recognized analytical methods and requiring consistent method performance criteria. Comparability is also dependent on similar quality assurance objectives. Previously collected data will be evaluated to determine whether they may be combined with contemporary data sets.

4.6 SENSITIVITY

Sensitivity is the ability of the instrument or method to detect target analytes at the levels of interest. The project director will select, with input from the laboratory and QA personnel, sampling and analytical procedures that achieve the required levels of detection and QC acceptance limits that meet established performance criteria. Concurrently, the project director will select the level of data assessment to ensure that only data meeting the project DQOs are used in decision-making.

Field equipment will be used that can achieve the required levels of detection for analytical measurements in the field. In addition, the field sampling staff will collect and submit full volumes of samples as required by the laboratory for analysis, whenever possible. Full volume aliquots will help ensure achievement of the required limits of detection and allow for reanalysis if necessary. The concentration of the lowest level check standard in a multi-point calibration curve will represent the RL.

Analytical methods and quality assurance parameters associated with the sampling program are presented in Attachment C. The frequency of associated field blanks and duplicate samples will be based on the recommendations listed in NYSDEC Division of Environmental Remediation (DER)-10, and as described in Section 5.3.

Site-specific MS/MSD samples will be prepared and analyzed by the analytical laboratory by spiking an aliquot of submitted sample volume with analytes of interest. Additional sample volume is not required by the laboratory for this purpose, so long as the full volume required for the sample analysis is collected. An MS/MSD analysis will be analyzed at a rate of 1 out of every 20 samples, or one per analytical batch. MS/MSD samples are only required for soil and groundwater samples.

5.0 SAMPLE COLLECTION AND FIELD DATA ACQUISITION PROCEDURES

Groundwater sampling will be conducted in accordance with the established NYSDEC protocols contained in NYSDEC Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10) (May 2010). Soil vapor sampling will be conducted in accordance with the established NYSDOH protocols contained in the Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006, updated May 2017). The following sections describe procedures to be followed for specific tasks.

5.1 FIELD DOCUMENTATION PROCEDURES

Field documentation procedures will include summarizing field observations in field books, logging soil borings and monitoring well construction, completing forms for groundwater sampling, and proper sample labeling. These procedures are described in the following sections.

5.1.1 Field Data and Notes

Field notebooks contain the documentary evidence regarding procedures conducted by field personnel. Hard cover, bound field notebooks will be used because of their compact size, durability, and secure page binding. The pages of the notebook will not be removed.

Entries will be made in waterproof, permanent blue or black ink. No erasures will be allowed. If an incorrect entry is made, the information will be crossed out with a single strike mark and the change initialed and dated by the team member making the change. Each entry will be dated. Entries will be legible and contain accurate and complete documentation of the individual or sampling team's activities or observations made. The level of detail will be sufficient to explain and reconstruct the activity conducted. Each entry will be signed by the person(s) making the entry.

The following types of information will be provided for each sampling task, as appropriate:

- Project name and number
- Reasons for being on-site or taking the sample
- Date and time of activity
- Sample identification numbers
- Geographical location of sampling points with references to the site, other facilities or a map coordinate system. Sketches will be made in the field logbook when appropriate
- Physical location of sampling locations such as depth below ground surface
- Description of the method of sampling including procedures followed, equipment used and any departure from the specified procedures

- Description of the sample including physical characteristics, odor, etc.
- Readings obtained from health and safety equipment
- Weather conditions at the time of sampling and previous meteorological events that may affect the representative nature of a sample
- Photographic information including a brief description of what was photographed, the date and time, the compass direction of the picture and the number of the picture on the camera
- Other pertinent observations such as the presence of other persons on the site, actions by others that may affect performance of site tasks, etc.
- Names of sampling personnel and signature of persons making entries

Field records will also be collected on field data sheets including boring logs, which will be used for geologic and drilling data during soil boring activities. Field data sheets will include the project-specific number and stored in the field project files when not in use. At the completion of the field activities, the field data sheets will be maintained in the central project file.

5.1.2 Sample Labeling

Each sample collected will be assigned a unique identification number and abbreviation in accordance with the sample nomenclature guidance provided in Attachment D, and placed in an appropriate sample container. Each sample container will have a sample label affixed to the outside with the date and time of sample collection and project name. In addition, the label will contain the sample identification number, analysis required and chemical preservatives added, if any. All documentation will be completed in waterproof ink.

5.2 EQUIPMENT CALIBRATION AND PREVENTATIVE MAINTENANCE

A PID will be used during the sampling activities to evaluate work zone action levels, collect pre- and post-sample readings for air samples, screen soil samples, and collect monitoring well headspace readings. Field calibration and/or field checking of the PID will be the responsibility of the field team leader and the site H&SO, and will be accomplished by following the procedures outlined in the operating manual for the instrument. At a minimum, field calibration and/or field equipment checking will be performed once daily, prior to use. Field calibration will be documented in the field notebook. Entries made into the logbook regarding the status of field equipment will include the following information:

- Date and time of calibration
- Type of equipment serviced and identification number (such as serial number)

- Reference standard used for calibration
- Calibration and/or maintenance procedure used
- Other pertinent information

A water quality meter (Horiba U-52 or similar) will be used during purging of groundwater to measure pH, specific conductance, temperature, dissolved oxygen, turbidity and oxidation-reduction-potential (ORP), every five minutes. Water-quality meters should be calibrated and the results documented before use each day using standardized field calibration procedures and calibration checks.

Equipment that fails calibration or becomes inoperable during use will be removed from service and segregated to prevent inadvertent utilization. The equipment will be properly tagged to indicate that it is out of calibration. Such equipment will be repaired and recalibrated to the manufacturer's specifications by qualified personnel. Equipment that cannot be repaired will be replaced.

Off-site calibration and maintenance of field instruments will be conducted as appropriate throughout the duration of project activities. All field instrumentation, sampling equipment and accessories will be maintained in accordance with the manufacturer's recommendations and specifications and established field equipment practice. Off-site calibration and maintenance will be performed by qualified personnel. A logbook will be kept to document that established calibration and maintenance procedures have been followed. Documentation will include both scheduled and unscheduled maintenance.

5.3 SAMPLE COLLECTION

Groundwater Samples

Groundwater sampling will be conducted using low-flow sampling procedures following USEPA guidance ("Low Stress [low flow] Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells", EQASOP-GW4, dated July 30, 1996, revised September 19, 2017).

During purging, field parameters should be measured, including: water level drawdown, purge rate, pH, specific conductance, temperature, dissolved oxygen, turbidity and ORP, every five minutes using a water quality meter (Horiba U-52 or similar) and a depth-to-water interface probe that should be decontaminated between wells. Samples should generally not be collected until the field parameters have stabilized. Field parameters will be considered stable once three sets of measurements are within ±0.1 standard units for pH, ±3% for conductivity and temperature, ±10 millivolts for ORP, and ±10% for turbidity and dissolved oxygen. Purge rates should be adjusted to keep the drawdown in the well to less than 0.3 feet, as practical. Additionally, an

attempt should be made to achieve a stable turbidity reading of less than 10 Nephelometric Turbidity Units (NTU) prior to sampling. If the turbidity reading does not stabilize at reading less than 10 NTU for a given well, then both filtered and unfiltered samples should be collected from that well. If necessary, field filtration should be performed using a 0.45 micron disposable in-line filter. Groundwater samples should be collected after parameters have stabilized as noted above or the readings are within the precision of the meter. Deviations from the stabilization and drawdown criteria, if any, should be noted on the sampling logs.

Samples should be collected directly into pre-cleaned laboratory-supplied jars. After collection, sample jars will be capped and securely tightened, and placed in iced coolers to attempt to maintain a temperature of 4°C ±2°C until they are transferred to the laboratory for analysis, in accordance with the procedures outlined in Section 5.4 and 5.6. Analysis and/or extraction and digestion of collected groundwater samples will meet the holding times required for each analyte as specified in Attachment C. In addition, analysis of collected groundwater samples will meet all quality assurance criteria set forth by this QAPP and DER-10.

Groundwater samples will analyzed for Part 375 TCL VOCs.

Air Samples

Prior to sampling, an inspection will assess the potential for interference from chemical storage nearby or within the building. Indoor air samples will be collected during SMD system operation into laboratory-supplied, batch certified-clean Summa® canisters placed at breathing height and calibrated for a sampling rate of 24 hours. The pressure gauges on each calibrated flow controller should be monitored throughout sample collection. Sample collection should be stopped when the pressure reading reaches -4 mmHg. Effluent air samples will be collected from a sample port downstream of the carbon treatment units, during SMD system operation, into laboratory-supplied, batch certified-clean Summa® canisters calibrated for a sampling rate of 15 minutes. The pressure gauges on each calibrated flow controller should be monitored throughout sample collection. Sample collection should be stopped when the pressure reading reaches -4 mmHg.

Indoor air and effluent air samples will be analyzed for United States Environmental Protection Agency (USEPA) VOCs (including naphthalene) via method TO-15. Analytical data will be validated and a Data Usability Summary Reports (DUSR) will be prepared as detailed in Section 6.3.

Soil Vapor Samples

Prior to sample collection, a pre-sampling inspection will be conducted to document chemicals and potential subsurface pathways at the site. Soil vapor samples will be collected into laboratory-supplied, batch certified-clean Summa® canisters calibrated for a sampling rate of two hours. The pressure gauges on each calibrated flow controller should be monitored throughout

sample collection. Sample collection should be stopped when the pressure reading reaches -4 mmHg.

Sample Field Blanks and Field Duplicates

Field blanks will be collected for quality assurance purposes at a rate of one per 20 investigation samples per matrix (groundwater only). Field blanks will be obtained by pouring laboratory-demonstrated analyte-free water into a laboratory-provided sample container for analysis. Field blank samples will be analyzed for the complete list of analytes on the day of sampling. To assess contamination resulting from sample transport, trip blanks will be collected at a rate of one per day if soil samples are analyzed for VOCs during that day. Equipment blanks will be collected at a minimum frequency of one per day per matrix for PFAS.

Field duplicate groundwater samples will be collected and analyzed for quality assurance purposes. Field duplicate samples will be collected at a frequency of 1 per 20 investigative samples per matrix and will be submitted to the laboratory as "blind" samples. If less than 20 samples are collected, one field duplicate sample will be collected. Field duplicates will be collected from the same sample volume as the parent sample.

5.4 SAMPLE CONTAINERS AND HANDLING

Certified, commercially clean sample containers will be obtained from the analytical laboratory. For soil and groundwater samples, the laboratory will also prepare and supply the required trip blanks and field blank sample containers and reagent preservatives. Sample bottle containers, including the field blank containers, will be placed into plastic coolers by the laboratory. These coolers will be received by the field sampling team within 24 hours of their preparation in the laboratory. Prior to the commencement of field work, Langan field personnel will fill the plastic coolers with ice in Ziploc bags (or equivalent) to attempt to maintain a temperature of 4° ±2° C.

Soil and/or groundwater samples collected in the field for laboratory analysis will be placed directly into the laboratory-supplied sample containers. Samples will then be placed and stored on ice in laboratory-provided coolers until shipment to the laboratory. Blue ice will not be used to cool PFAS samples. The temperature in the coolers containing samples and associated field blanks will be maintained at a temperature of 4°±2°C while on-site and during sample shipment to the analytical laboratory.

Possession of samples collected in the field will be traceable from the time of collection until they are analyzed by the analytical laboratory or are properly disposed. Chain-of-custody procedures, described in Section 5.10, will be followed to maintain and document sample possession. Samples will be packaged and shipped as described in Section 5.7.

5.5 SPECIAL CONSIDERATIONS FOR PFAS SAMPLE COLLECTION

The following special considerations apply to the collection of soil and groundwater samples for PFAS analysis to prevent cross-contamination:

- Field equipment will not contain Teflon®
- All sampling material will be made from stainless steel, high-density polyethylene (HDPE), acetate, silicon, or polypropylene
- No waterproof field books will be used
- No plastic clipboards, binders, or spiral hard cover notebooks will be used
- No adhesives will be used
- No sharpies or permanent markers will be used; ball point pens are acceptable
- Aluminum foil will not be used
- PFAS samples will be kept in a separate cooler from other sampling containers
- Coolers will be filled only with regular ice

The PFAS sampling protocol and the laboratories SOP for PFAS analysis are provided in Attachment E.

5.6 SAMPLE PRESERVATION

Sample preservation measures will be used in an attempt to prevent sample decomposition by contamination, degradation, biological transformation, chemical interactions and other factors during the time between sample collection and analysis. Preservation will commence at the time of sample collection and will continue until analyses are performed. Should chemical preservation be required, the analytical laboratory will add the preservatives to the appropriate sample containers before shipment to the office or field. Samples will be preserved according to the requirements of the specific analytical method selected, as shown in Attachment C.

5.7 SAMPLE SHIPMENT

5.7.1 Packaging

Soil vapor samples canisters can be stored and transported without additional packaging. Soil and groundwater sample containers will be placed in plastic coolers. Ice in Ziploc bags (or equivalent) will be placed around sample containers. Cushioning material will be added around the sample containers if necessary. Chains-of-custody and other paperwork will be placed in a Ziploc bag (or equivalent) and placed inside the cooler. The cooler will be taped closed and custody seals will be affixed to one side of the cooler at a minimum. If the samples are being

shipped by an express delivery company (e.g. FedEx) then laboratory address labels will be placed on top of the cooler.

5.7.2 Shipping

Standard procedures to be followed for shipping environmental samples to the analytical laboratory are outlined below.

- All environmental samples will be transported to the laboratory by a laboratory-provided courier under the chain-of-custody protocols described in Section 5.10.
- Prior notice will be provided to the laboratory regarding when to expect shipped samples. If the number, type or date of shipment changes due to site constraints or program changes, the laboratory will be informed.

5.8 DECONTAMINATION PROCEDURES

Decontamination procedures will be used for non-dedicated sampling equipment. Decontamination of field personnel is discussed in the site-specific CHASP included in Appendix D of the RAWP. Field sampling equipment that is to be reused will be decontaminated in the field in accordance with the following procedures:

1. Laboratory-grade glassware detergent and tap water scrub to remove visual contamination
2. Generous tap water rinse
3. Distilled/de-ionized water rinse

Any field sampling equipment that is to be reused for PFAS sampling will be decontaminated in the field in accordance with the following procedures:

1. Alconox detergent and "PFAS-free" water scrub to remove visual contamination
2. Generous PFAS-free" water rinse

5.9 RESIDUALS MANAGEMENT

Debris (e.g., paper, plastic and disposable personal protective equipment [PPE]) will be collected in plastic garbage bags and disposed of as non-hazardous industrial waste. Debris is expected to be transported to a local municipal landfill for disposal. If applicable, residual solids (e.g., leftover soil cuttings) will be placed back in the borehole from which it was sampled. If gross contamination is observed, soil will be collected and stored in Department of Transportation (DOT)-approved 55-gallon drums in a designated storage area at the Site. The residual materials stored in a designated storage area at the site for further characterization, treatment or disposal.

Residual fluids (such as purge water) will be collected and stored in DOT-approved (or equivalent) 55-gallon drums in a designated storage area at the site. The residual fluids will be transported to the on-site wastewater treatment plant or analyzed, characterized and disposed off-site in accordance with applicable federal and state regulations. Residual fluids such as decontamination water may be discharged to the ground surface, however, if gross contamination is observed, the residual fluids will be collected, stored, and transported similar purge water or other residual fluids.

5.10 CHAIN OF CUSTODY PROCEDURES

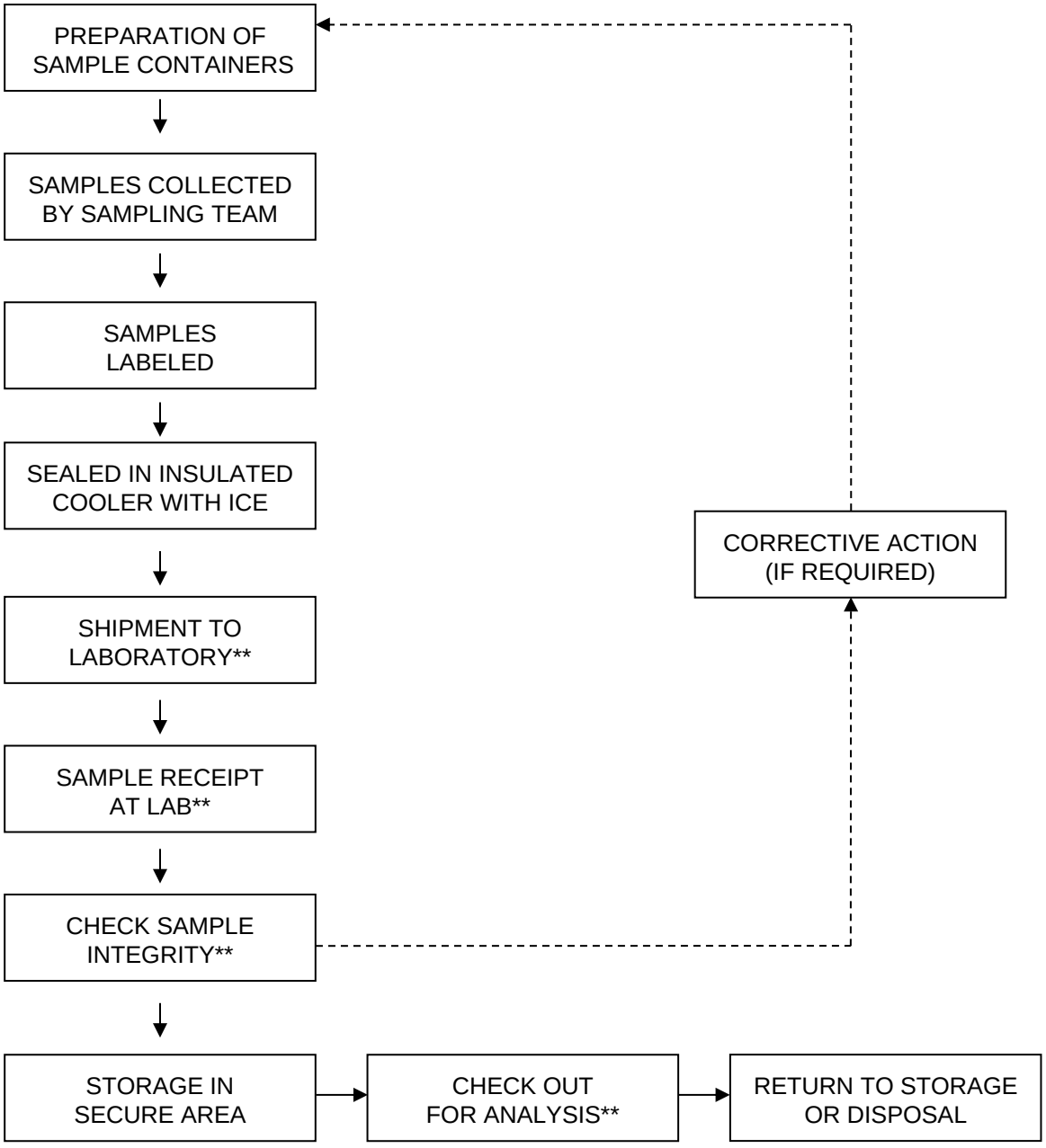
A chain-of-custody protocol has been established for collected samples that will be followed during sample handling activities in both field and laboratory operations. The primary purpose of the chain-of-custody procedures is to document the possession of the samples from collection through shipping, storage and analysis to data reporting and disposal. Chain-of-custody refers to actual possession of the samples. Samples are considered to be in custody if they are within sight of the individual responsible for their security or locked in a secure location. Each person who takes possession of the samples, except the shipping courier, is responsible for sample integrity and safe keeping. Chain-of-custody procedures are provided below:

- Chain-of-custody will be initiated by the laboratory supplying the pre-cleaned and prepared sample containers. Chain-of-custody forms will accompany the sample containers.
- Following sample collection, the chain-of-custody form will be completed for the sample collected. The sample identification number, date and time of sample collection, analysis requested and other pertinent information (e.g., preservatives) will be recorded on the form. All entries will be made in waterproof, permanent blue or black ink.
- Langan field personnel will be responsible for the care and custody of the samples collected until the samples are transferred to another party, dispatched to the laboratory, or disposed. The sampling team leader will be responsible for enforcing chain-of-custody procedures during field work.
- When the form is full or when all samples have been collected that will fit in a single cooler, the sampling team leader will check the form for possible errors and sign the chain-of-custody form. Any necessary corrections will be made to the record with a single strike mark, dated, and initialed.

Sample coolers will be accompanied by the chain-of-custody form, sealed in a Ziploc® bag (or equivalent) and placed on top of the samples or taped to the inside of the cooler lid. If applicable, a shipping bill will be completed for each cooler and the shipping bill number recorded on the chain-of-custody form.

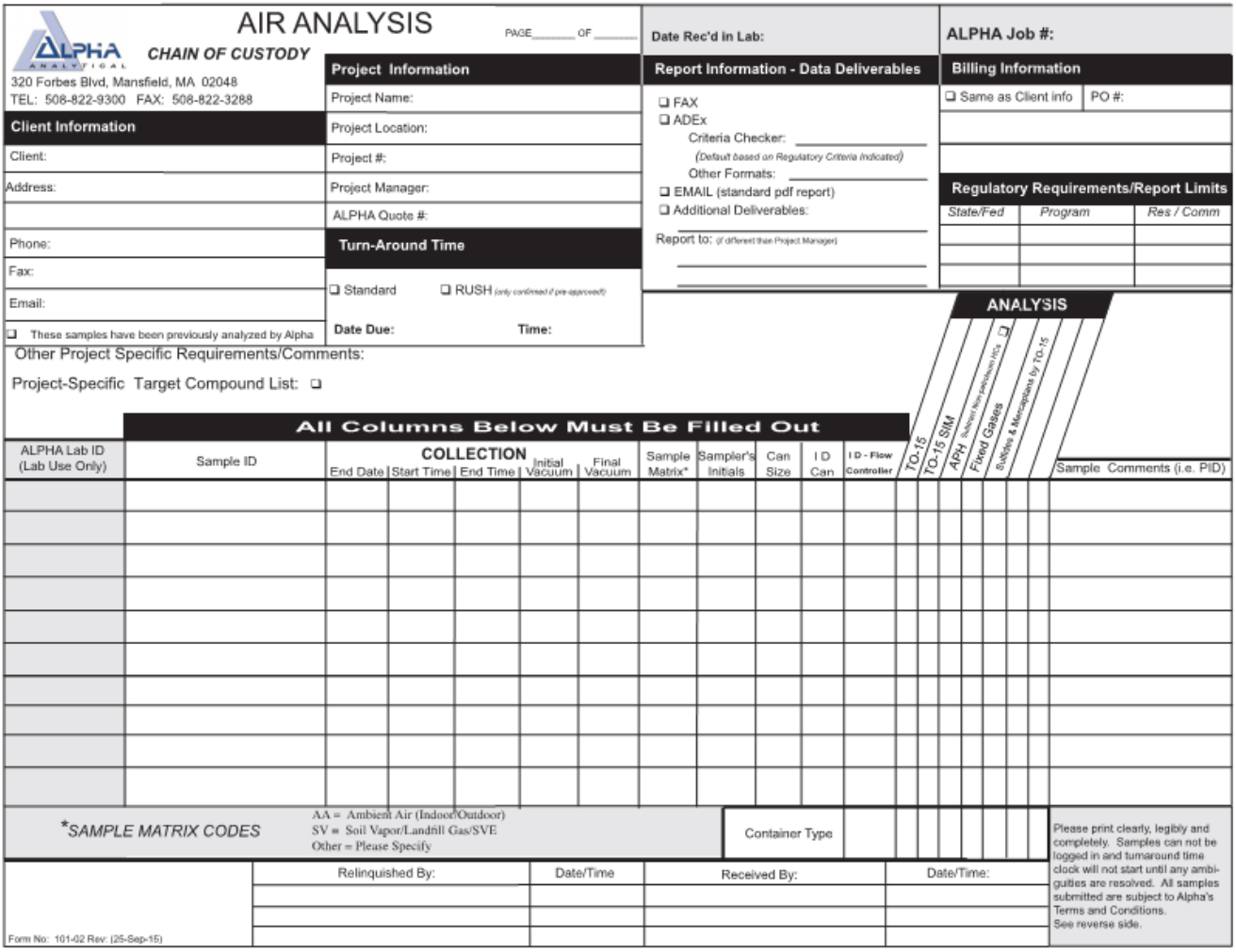
Samples will be packaged for shipment to the laboratory with the appropriate chain-of-custody form. A copy of the form will be retained by the sampling team for the project file and the original will be sent to the laboratory with the samples. Bills of lading will also be retained as part of the documentation for the chain-of-custody records, if applicable. When transferring custody of the samples, the individuals relinquishing and receiving custody of the samples will verify sample numbers and condition and will document the sample acquisition and transfer by signing and dating the chain-of-custody form. This process documents sample custody transfer from the sampler to the analytical laboratory. A flow chart showing a sample custody process is included as Figure 5.1. Blank chain-of-custody forms from Alpha are included as Figures 5.2 and 5.3.

Figure 5.1 Sample Custody



*SUMMA CANISTERS SHOULD NOT BE ICED
**REQUIRES SIGN-OFF ON CHAIN-OF-CUSTODY FORM

Figure 5.2 Sample Chain-of-Custody Form – Air Samples



AIR ANALYSIS — CHAIN OF CUSTODY

PAGE_____ OF _____

ALPHA ANALYTICAL
320 Forbes Blvd, Mansfield, MA 02048
TEL: 508-822-9300 FAX: 508-822-3288

Client Information
Client:
Address:
Phone:
Fax:
Email:
❑ These samples have been previously analyzed by Alpha

Project Information
Project Name:
Project Location:
Project #:
Project Manager:
ALPHA Quote #:

Turn-Around Time
❑ Standard ❑ RUSH (only confirmed if pre-approved)
Date Due: Time:

Date Rec'd in Lab:

Report Information - Data Deliverables
❑ FAX
❑ ADEx
Criteria Checker:
(Default based on Regulatory Criteria Indicated)
Other Formats:
❑ EMAIL (standard pdf report)
❑ Additional Deliverables:
Report to: (if different than Project Manager)

ALPHA Job #:

Billing Information
❑ Same as Client info PO #:

Regulatory Requirements/Report Limits

State/Fed	Program	Res / Comm

Other Project Specific Requirements/Comments:

Project-Specific Target Compound List: ❑

ANALYSIS

All Columns Below Must Be Filled Out

ALPHA Lab ID (Lab Use Only)	Sample ID	COLLECTION End Date	Start Time	End Time	Initial Vacuum	Final Vacuum	Sample Matrix*	Sampler's Initials	Can Size	I D Can	I D - Flow Controller	TO-15	TO-15 SIM	APH (Subject to prioritization) ❑	Fixed Gases	Sulfides & Mercaptans by TO-15			Sample Comments (i.e. PID)

*SAMPLE MATRIX CODES
AA = Ambient Air (Indoor/Outdoor)
SV = Soil Vapor/Landfill Gas/SVE
Other = Please Specify

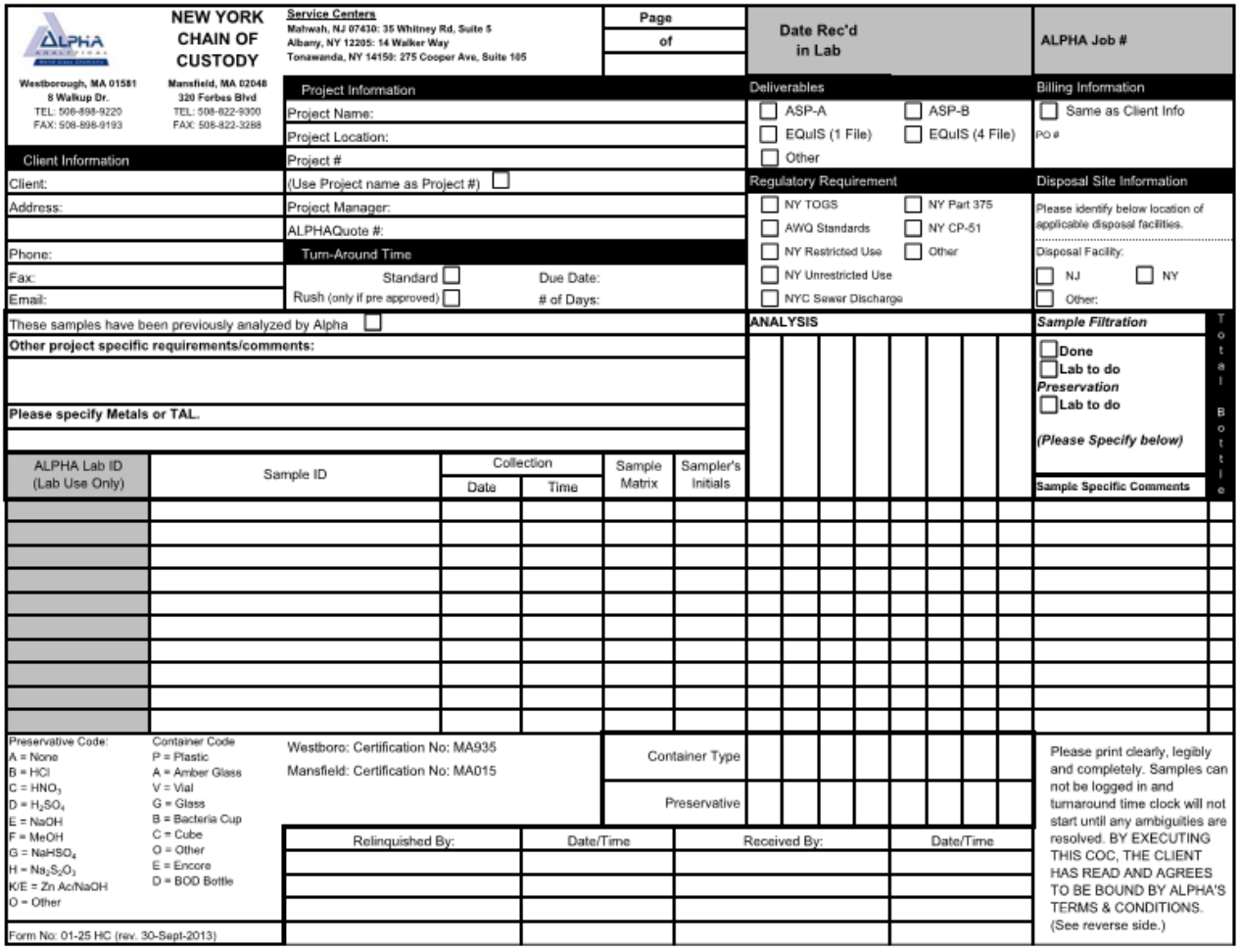
Container Type

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

Relinquished By:	Date/Time	Received By:	Date/Time:

Form No: 101-02 Rev: (25-Sep-15)

Figure 5.3 Sample Chain-of-Custody Form – Soil and Groundwater



ALPHA ANALYTICAL

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

NEW YORK CHAIN OF CUSTODY

Service Centers
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Page
of

Date Rec'd in Lab

ALPHA Job #

Project Information
Project Name:
Project Location:
Project #
(Use Project name as Project #)
Project Manager:
ALPHAQuote #:

Turn-Around Time
Standard
Rush (only if pre approved)
Due Date:
# of Days:

Deliverables
ASP-A
ASP-B
EQuIS (1 File)
EQuIS (4 File)
Other

Regulatory Requirement
NY TOGS
NY Part 375
AWQ Standards
NY CP-51
NY Restricted Use
Other
NY Unrestricted Use
NYC Sewer Discharge

Billing Information
Same as Client Info
PO #

Disposal Site Information
Please identify below location of applicable disposal facilities.
Disposal Facility:
NJ
NY
Other:

Client Information
Client:
Address:
Phone:
Fax:
Email:

These samples have been previously analyzed by Alpha

Other project specific requirements/comments:

Please specify Metals or TAL.

ANALYSIS

Sample Filtration
Done
Lab to do
Preservation
Lab to do
(Please Specify below)

Total Bottle

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Sample Specific Comments

Container Type
Preservative

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS. (See reverse side.)

Form No: 01-25 HC (rev. 30-Sept-2013)

Laboratory chain-of-custody will be maintained throughout the analytical processes as described in the laboratory's QA Manual. The analytical laboratory will provide a copy of the chain-of-custody in the analytical data deliverable package. The chain-of-custody becomes the permanent record of sample handling and shipment.

5.11 LABORATORY SAMPLE STORAGE PROCEDURES

The subcontracted laboratory will use a laboratory information management system (LIMS) to track and schedule samples upon receipt by the analytical laboratories. Any sample anomalies identified during sample log-in must be evaluated on individual merit for the impact upon the results and the data quality objectives of the project. When irregularities do exist, the environmental consultant must be notified to discuss recommended courses of action and documentation of the issue must be included in the project file.

For samples requiring thermal preservation, the temperature of each cooler will be immediately recorded. Each sample and container will be assigned a unique laboratory identification number and secured within the custody room walk-in coolers designated for new samples. Samples will be, as soon as practical, disbursed in a manner that is functional for the operational team. The temperature of all coolers and freezers will be monitored and recorded using a certified temperature sensor. Any temperature excursions outside of acceptance criteria (i.e., below 2°C or above 6°C) will initiate an investigation to determine whether any samples may have been affected. Samples for VOCs will be maintained in satellite storage areas within the VOC laboratory. Following analysis, the laboratory's specific procedures for retention and disposal will be followed as specified in the laboratory's SOPs and/or QA manual.

6.0 DATA REDUCTION, VALIDATION, AND REPORTING

6.1 INTRODUCTION

Data collected during the field investigation will be reduced and reviewed by the laboratory QA personnel, and a report on the findings will be tabulated in a standard format. The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the USEPA SW-846 and subsequent updates. The data package provided by the laboratory will contain all items specified in the USEPA SW-846 appropriate for the analyses to be performed, and be reported in standard format.

The completed copies of the chain-of-custody records (both external and internal) accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the analytical reports.

6.2 DATA REDUCTION

The Analytical Services Protocol (ASP) Category B data packages and an electronic data deliverable (EDD) will be provided by the laboratory after receipt of a complete sample delivery group. The Project Manager will immediately arrange for archiving the results and preparation of result tables. These tables will form the database for assessment of the site contamination condition.

Each EDD deliverable must be formatted using a Microsoft Windows operating system and the NYSDEC data deliverable format for EQuIS. To avoid transcription errors, data will be loaded directly into the American Standard Code for Information Interchange (ASCII) format from the LIMS. If this cannot be accomplished, the consultant should be notified via letter of transmittal indicating that manual entry of data is required for a particular method of analysis. All EDDs must also undergo a QC check by the laboratory before delivery. The original data, tabulations, and electronic media are stored in a secure and retrievable fashion.

The Project Manager or Task Manager will maintain close contact with the QA reviewer to ensure all non-conformance issues are acted upon prior to data manipulation and assessment routines. Once the QA review has been completed, the Project Manager may direct the Team Leaders or others to initiate and finalize the analytical data assessment.

6.3 DATA VALIDATION

Data validation will be performed in accordance with the USEPA Region 2 SOPs for data validation and USEPA's National Functional Guidelines for Organic and Inorganic Data Review. Tier 1 data validation (the equivalent of USEPA's Stage 2A validation) will be performed to evaluate data quality. Tier 1 data validation is based on completeness and compliance checks of sample-related QC results including:

- Holding times;
- Sample preservation;
- Blank results (method, trip, and field blanks);
- Surrogate recovery compounds and extracted internal standards (as applicable);
- LCS and LCSD recoveries and RPDs;
- MS and MSD recoveries and RPDs;
- Laboratory duplicate RPDs; and
- Field duplicate RPDs

A DUSR will be prepared by the data validator and reviewed by the Quality Assurance Manager before issuance. The DUSR will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain-of-custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method.

Based on the results of data validation, the validated analytical results reported by the laboratory will be assigned one of the following usability flags:

- "U" - Not detected. The associated number indicates the approximate sample concentration necessary to be detected significantly greater than the level of the highest associated blank;
- "UJ" - Not detected. Quantitation limit may be inaccurate or imprecise;
- "J" - Analyte is present. Reported value may be associated with a higher level of uncertainty than is normally expected with the analytical method
- "R" – Unreliable result; data is rejected or unusable. Analyte may or may not be present in the sample; and
- No Flag - Result accepted without qualification.

6.4 REPORTING

Upon receipt of validated analytical results, NYSDEC format EDDs, compatible with EQuIS, will be prepared and submitted to the NYSDEC.

7.0 QUALITY ASSURANCE PERFORMANCE AUDITS AND SYSTEM AUDITS

7.1 INTRODUCTION

Quality assurance audits may be performed by the project quality assurance group under the direction and approval of the QAO. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s). Functioning as an independent body and reporting directly to corporate quality assurance management, the QAO may plan, schedule, and approve system and performance audits based upon procedures customized to the project requirements. At times, the QAO may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits. However, these personnel will not have responsibility for the project work associated with the performance audit.

7.2 SYSTEM AUDITS

System audits may be performed by the QAO or designated auditors, and encompass a qualitative evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory quality control procedures and associated documentation may be system audited. These audits may be performed once during the performance of the project. However, if conditions adverse to quality are detected or if the Project Manager requests, additional audits may be performed.

7.3 PERFORMANCE AUDITS

The laboratory may be required to conduct an analysis of Performance Evaluation samples or provide proof that Performance Evaluation samples submitted by USEPA or a state agency have been analyzed within the past twelve months.

7.4 FORMAL AUDITS

Formal audits refer to any system or performance audit that is documented and implemented by the QA group. These audits encompass documented activities performed by qualified lead auditors to a written procedure or checklists to objectively verify that quality assurance requirements have been developed, documented, and instituted in accordance with contractual and project criteria. Formal audits may be performed on project and subcontractor work at various locations.

Audit reports will be written by auditors who have performed the site audit after gathering and evaluating all data. Items, activities, and documents determined by lead auditors to be in noncompliance shall be identified at exit interviews conducted with the involved management. Non-compliances will be logged, and documented through audit findings, which are attached to

and are a part of the integral audit report. These audit-finding forms are directed to management to satisfactorily resolve the noncompliance in a specified and timely manner.

The Project Manager has overall responsibility to ensure that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily. Audit reports must be submitted to the Project Manager within fifteen days of completion of the audit. Serious deficiencies will be reported to the Project Manager within 24 hours. All audit checklists, audit reports, audit findings, and acceptable resolutions are approved by the QAO prior to issue. Verification of acceptable resolutions may be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the QAO will close out the audit report and findings.

8.0 CORRECTIVE ACTION

8.1 INTRODUCTION

The following procedures have been established to ensure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected.

8.2 PROCEDURE DESCRIPTION

When a significant condition adverse to quality is noted at site, laboratory, or subcontractor location, the cause of the condition will be determined and corrective action will be taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the QAO, Project Manager, Field Team Leader and involved contractor management, at a minimum. Implementation of corrective action is verified by documented follow-up action.

All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality. Corrective actions will be initiated as follows:

- When predetermined acceptance standards are not attained;
- When procedure or data compiled are determined to be deficient;
- When equipment or instrumentation is found to be faulty;
- When samples and analytical test results are not clearly traceable;
- When quality assurance requirements have been violated;
- When designated approvals have been circumvented;
- As a result of system and performance audits;
- As a result of a management assessment;
- As a result of laboratory/field comparison studies; and
- As required by USEPA SW-846, and subsequent updates, or by the NYSDEC ASP.

Project management personnel, field investigation teams, remedial response planning personnel, and laboratory groups, monitor on-going work performance in the normal course of daily responsibilities. Work may be audited at the sites, laboratories, or contractor locations. Activities, or documents ascertained to be noncompliant with quality assurance requirements will be documented. Corrective actions will be mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the Task Manager.

Personnel assigned to quality assurance functions will have the responsibility to issue and control Corrective Action Request (CAR) Forms (Figure 8.1 or similar by email). The CAR identifies the out-of-compliance condition, reference document(s), and recommended corrective action(s) to be administered. The CAR is issued to the personnel responsible for the affected item or activity. A copy is also submitted to the Project Manager. The individual to whom the CAR is addressed returns the requested response promptly to the QA personnel, affixing his/her signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The QA personnel maintain the log for status of CARs, confirms the adequacy of the intended corrective action, and verifies its implementation. CARs will be retained in the project file for the records.

Any project personnel may identify noncompliance issues; however, the designated QA personnel are responsible for documenting, numbering, logging, and verifying the close out action. The Project Manager will be responsible for ensuring that all recommended corrective actions are implemented, documented, and approved.

FIGURE 8.1 Corrective Action Request

CORRECTIVE ACTION REQUEST
Number: _____ Date: _____
TO: _____ You are hereby requested to take corrective actions indicated below and as otherwise determined by you to (a) resolve the noted condition and (b) to prevent it from recurring. Your written response is to be returned to the project quality assurance manager by _____
CONDITION:
REFERENCE DOCUMENTS:
RECOMMENDED CORRECTIVE ACTIONS:
_____ _____ _____ _____ _____ _____ Originator Date Approval Date Approval Date
RESPONSE
CAUSE OF CONDITION
CORRECTIVE ACTION (A) RESOLUTION (B) PREVENTION (C) AFFECTED DOCUMENTS
C.A. FOLLOW UP: CORRECTIVE ACTION VERIFIED BY: _____ DATE:_____

9.0 REFERENCES

1. NYSDEC. Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS), dated April 2023.
2. NYSDEC. Division of Environmental Remediation. DER-10/Technical Guidance for Site Investigation and Remediation, dated May 3, 2010.
3. NYSDOH. Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006, updated May 2017.
4. Taylor, J. K., 1987. Quality Assurance of Chemical Measurements. Lewis Publishers, Inc., Chelsea, Michigan
5. USEPA, 2014. "Test Method for Evaluating Solid Waste," Update V dated July 2014 U.S. Environmental Protection Agency, Washington, D.C..
6. USEPA, 2016. Region II Standard Operating Procedure (SOP) #HW-34, "Trace Volatile Data Validation" (September 2016, Revision 1), USEPA Hazardous Waste Support Section. USEPA Region II.
7. USEPA, 2016. Region II SOP #HW-33A, "Low/Medium Volatile Data Validation" (September 2016, Revision 1), USEPA Hazardous Waste Support Section. USEPA Region II.
8. USEPA, 2016. Region II SOP #HW-35A, "Semivolatile Data Validation" (September 2016, Revision 1), USEPA Hazardous Waste Support Section. USEPA Region II.
9. USEPA, 2016. Region II SOP #HW-36A, "Pesticide Data Validation" (October 2016, Revision 1), USEPA Hazardous Waste Support Section. USEPA Region II.
10. USEPA, 2015. Region II SOP #HW-37A, "PCB Aroclor Data Validation" (June 2015, Revision 0), USEPA Hazardous Waste Support Section. USEPA Region II.
11. USEPA 2015. Region II SOP #HW-3a, "ICP-AES Data Validation" (July 2015, Revision 0), USEPA Hazardous Waste Support Section. USEPA Region II.
12. USEPA, 2016. Region II SOP #HW-3b, "ICP-MS Data Validation" (September 2016, Revision 1), USEPA Hazardous Waste Support Section. USEPA Region II.
13. USEPA, 2016. Region II SOP #HW-3c, "Mercury and Cyanide Data Validation" (September 2016, Revision 1), USEPA Hazardous Waste Support Section. USEPA Region II.
14. USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review, Office of Superfund Remediation and Technology Innovation, EPA-540-R-20-005, November 2020.

15. USEPA 2017b. National Functional Guidelines for Superfund Inorganic Methods Data Review, Office of Superfund Remediation and Technology Innovation, EPA-540-R-20-006, November 2020.

16. USEPA, 2016. Region II SOP HW-31, "Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15" (September 2016, Revision 6), USEPA Hazardous Waste Support Section. USEPA Region II.

17. USEPA, 1987. Data Quality Objectives for Remedial Response Actions Activities: Development Process, EPA/540/G-87/003, OSWER Directive 9355.0-7- USEPA, Washington, D.C.

ATTACHMENT A

RÉSUMÉS

JASON J. HAYES, PE, LEED AP

PRINCIPAL/VICE PRESIDENT

ENVIRONMENTAL ENGINEERING

Mr. Hayes has experience in New York, New Jersey, Washington D.C., California, Washington, Oregon, Alaska, and Internationally. His experience includes Environmental Protection Agency (EPA), New York State (NYS) Brownfields applications, investigation, and remediation; New York City Department of Environmental Protection (NYCDEP) and New York City Office of Environmental Remediation (OER) E-designated site applications, investigations, and remediation. His expertise also includes Phase I and II Environmental Site Investigations and Assessments; contaminated building cleanup and demolition; Underground Storage Tank (UST) permitting, removal specifications, and closure reporting; soil vapor intrusion investigation and mitigation system design (depressurization systems, etc.); development of groundwater contaminant plume migration models; environmental analysis; and oversight, design and specification generation for remediation operations with contaminants of concern to include polychlorinated biphenyls (PCBs), solvents, mercury, arsenic, petroleum products, asbestos, mold and lead.

SELECTED PROJECTS

- NYCDPR Bushwick Inlet Park (Phase I ESA, Approvals for NYC E-Designation), Brooklyn, NY
- WCS New York Aquarium, Shark Tank and Animal Care Facility (Environmental Remediation), Coney Island, NY
- NYC School Construction Authority (PCB Remediation), Various Locations, New York, NY
- 28-29 High Line (Phase I ESA, Phase II ESI, and Environmental Remediation), New York, NY
- Georgetown Heating Plant (Phase II ESI and Remedial Design for Mercury Impacted Site), Washington D.C.
- 268 West Street (BCP Application, RI and RIWP), New York, NY
- Confidential Multiple Mixed-Use Tower Location (BCP Application, RI, Phase I ESA, and Phase II ESI), New York, NY
- Dock 72 at Brooklyn Navy Yard, (NYS Voluntary Cleanup Program), Brooklyn, NY
- 27-21 44th Drive (BCP Application, Remedial Investigation Phase I ESA, and Phase II ESI), Long Island City, NY
- Purves Street Development, BCP Application, RAWP, and Phase II ESI, Long Island City, NY
- 267-273 West 87th Street (BCP Application, Remedial Investigation, RIWP, RAWP), New York, NY
- International Leadership Charter School (Environmental Remediation), Bronx, NY
- West & Watts (BCP Application), New York, NY
- Hudson Yards Redevelopment (Phase I ESA and Phase II ESI), New York, NY
- 627 Smith Street (RI and Report), Brooklyn, NY



EDUCATION

M.S., Environmental Engineering
Columbia University

B.S., Chemistry, Environmental Toxicology (Business Administration minor)
Humboldt State University

PROFESSIONAL REGISTRATION

Professional Engineer (PE) in NY

LEED Accredited Professional (LEED AP)

Troxler Certification for Nuclear Densometer Training

OSHA 40-Hour HAZWOPER

OSHA HAZWOPER Site Supervisor

AFFILIATIONS

US Green Building Council, NYC Chapter, Communications Committee

Urban Land Institute (ULI), member

Commercial Real Estate Development Associations (NAIOP), member

LANGAN

- Gateway Center II Retail (Phase I ESA and Phase II ESI), Brooklyn, NY
- 261 Hudson Street (Phase I ESA, Phase II ESI, BCP, and RAWP), New York, NY
- Riverside Center, Building 2 (BCP, Phase I ESA and Phase II ESI), New York, NY
- New York Police Academy, (Sub-Slab Depressurization and Vapor Barrier System), College Point, NY
- Bronx Terminal Market (BCP, RIWP, RAWP, Phase I ESA and Phase II ESI), Bronx, NY
- Jacob Javits Convention Center (Phase I ESA and Phase II ESI), New York, NY
- Yankee Stadium Development Waterfront Park (NYSDEC Spill Sites), Bronx, NY
- Silvercup West (BCP, RIWP, RIR, RAWP, and RAA), Long Island City, NY
- 29 Flatbush, Tall Residential Building (Groundwater Studies, RIR and RAWP), Brooklyn, NY
- Gowanus Village I (BCP, RIWP and RIR), Brooklyn, NY
- Sullivan Street Hotel (Site Characterization Study and Owner Representation), New York, NY
- Riker's Island Co-Generation Plant (Soil and Soil Vapor Quality Investigations), Bronx, NY
- The Shops at Atlas Park (Sub-Slab Depressurization and Vapor Barrier Design), Glendale, NY
- Memorial Sloan-Kettering Cancer Center (Subsurface and Soil Vapor Intrusion Investigations), New York, NY
- Element West 59th Street (Oversight and Monitoring of Sub-Slab Depressurization and Vapor Barrier Systems), New York, NY
- Teterboro Airport (Delineation and Remedial Oversight of Petroleum-Contaminated Soils), Teterboro, NJ
- Proposed New York JETS Stadium (Phase I ESA), New York, NY
- Former Con Edison Manufactured Gas Plant Sites (Research Reports), New York, NY
- 7 World Trade Center (Endpoint Sampling and Final Closure Report), New York, NY
- Peter Cooper Village, Environmental Subsurface Investigations, New York, NY
- Greenpoint Terminal Market (BCP), Brooklyn, NY
- Confidential Location (Remediation for Mercury-Contaminated Site), New York, NY
- Confidential Location (Phase II ESI and Remedial Design for Mercury Impacted Site), Brooklyn, NY

NYC Brownfield Partnership, member

SELECTED PUBLICATIONS, REPORTS, AND PRESENTATIONS

NYC Mayor's Office of Environmental Remediation – Big Apple Brownfield Workshop – Presented on Soil Vapor Intrusion Remedies (e.g., SSD Systems, Vapor Barriers, Modified HVAC)

New York City Brownfield Partnership – Presented on environmental considerations and complications of the Hudson Yards Development

Waterfront Development Technical Course – Presented on Impacted Waterfront Planning Considerations

MICHAEL D. BURKE, PG, CHMM, LEED AP

PRINCIPAL/VICE PRESIDENT

ENVIRONMENTAL ENGINEERING AND REMEDIATION

Mr. Burke is a geologist/environmental scientist whose practice involves site investigation and remediation, transactional due diligence, environmental site assessments, in-situ remedial technology, and manufactured gas plant (MGP) site characterization and remediation. His additional services include multi-media compliance audits, sub-slab depressurization system design, non-hazardous and hazardous waste management, emergency response, community air monitoring programs, environmental and geotechnical site investigations, and health and safety monitoring. He has experience with projects in the New York State Department of Environmental Conservation (NYSDEC) and New York State Brownfield Cleanup (NYS BCP) Programs; Inactive Hazardous Waste, and Spill Programs, and New York City Office of Environmental Remediation (OER) e-designated and New York City Voluntary Cleanup Program (NYC VCP) sites.

SELECTED PROJECTS

- 227-14 North Conduit Avenue, Industrial Wastewater Compliance, Jamaica, NY
- 420 Kent Avenue, NYS Brownfield Cleanup Program, Brooklyn, NY
- 572 Eleventh Avenue, NYC VCP, New York, NY
- Monian Site A, OER E-Designated Site, New York, NY
- 537 Sackett Street, Gowanus Canal Due Diligence/MGP Site, Brooklyn, NY
- ABC Blocks 25, 26 and 27, NYS Brownfield Cleanup Program Sites, Long Island City, NY
- 432 Rodney Street, NYS Brownfield Cleanup Program, Petroleum and Chlorinated Volatile Organic Compound Investigation and Remediation, Brooklyn, NY
- 787 Eleventh Avenue, NYS Brownfield Cleanup Program Site, New York, NY
- President Street at Gowanus Canal, NYS Brownfield Cleanup Program Site, Brooklyn, NY
- 22-36 Second Avenue at Gowanus Canal, NYS Brownfield Cleanup Program Site, Brooklyn, NY
- 563 Sacket Street, NYS Brownfield Cleanup Program Site, MGP Investigation, and Remediation, Brooklyn, NY
- 156-162 Perry Street, NYS Brownfield Cleanup Program Site, New York, NY
- Christopher and Weehawken Streets, NYS Brownfield Cleanup Program, New York, NY
- Phelps Dodge Block 2529 (Lots 40, 50, and 45), Inactive Hazardous Waste Disposal Site, Maspeth NY
- 42-50 24th Street, NYS Brownfield Cleanup Program Site, Long Island City, NY
- Storage Deluxe (163 6th Street), OER E-Designation Site, New York, NY



EDUCATION

M.S., Environmental Geology
Rutgers University

B.S., Geological Sciences
Rutgers University

B.S., Environmental Science
Rutgers University

PROFESSIONAL REGISTRATION

Professional Geologist (PG) in NY

Certified Hazardous Materials Manager – CHMM No. 15998

LEED Accredited Professional (LEED AP)

OSHA Certification for Hazardous Waste Site Supervisor

OSHA 29 CFR 1910.120 Certification for Hazardous Waste Operations and Emergency Response

NJDEP Certification for Community Noise Enforcement

AFFILIATIONS

New York State Council of Professional Geologists – Board of Directors

LANGAN

- Prospect Park Redevelopment, Landfill Reclamation, Prospect Park, NJ
- 431 Carroll Street, Gowanus Canal Due Diligence, Brooklyn, NY
- 76 4th Street Property, Gowanus Due Diligence, Brooklyn, NY
- Foxgate/MREC, Due Diligence and Solid Waste Compliance, Central Islip, NY
- 175-225 3rd Street at Gowanus Canal, NYS Brownfield Cleanup Program, Brooklyn, NY
- New York University Tandon School of Engineering, Spill Investigation/Remediation Dual Phase Recovery, and Laser Fluorescence Investigation, Brooklyn, NY
- 2420-2430 Amsterdam Avenue, NYS Brownfield Cleanup Program/Board of Standards and Appeals Variance, New York, NY
- 170 Amsterdam Avenue, NYC VCP, New York, NY
- 538-540 Hudson Street, NYS Brownfield Cleanup Program (Former Gas Station), New York, NY
- 234 Butler Street, Gowanus Canal Due Diligence, Brooklyn, NY
- 550 Clinton Street, NYS Brownfield Cleanup Program E-Designation, Brooklyn, NY
- 111 Leroy Street, OER E-Designation Site, New York, NY
- 335 Bond Street, NYS Brownfield Cleanup Program, New York, NY
- Gowanus Canal Northside, NYS BCP Former Fuel Oil Terminal, Brooklyn, NY
- Multiple Buildings, Major Oil Storage Facility, Gowanus Canal Location, Brooklyn, NY
- 197-205 Smith Street at Gowanus Canal, MGP Due Diligence, Brooklyn, NY
- 450 Union Street at Gowanus Canal, NYS Brownfield Cleanup Program, Brooklyn, NY
- 86 Fleet Place, NYC VCP E-Designation, Brooklyn, NY
- New York University College of Nursing at 433 1st Avenue, NYS BCP, Bronx, NY
- Retail Building at 225 3rd Street, Brooklyn, NY
- 29-37 41st Avenue, NYS Brownfield Cleanup Program, Long Island City, NY
- 43-01 22nd Street, NYS Brownfield Cleanup Program, Long Island City, NY
- Compliance Audit for NYU at Washington Square Park, New York, NY
- Former Watermark Locations, NYS Brownfield Cleanup Program, Chlorinated Volatile Organic Compound Investigation and Remediation; AS/SVE, Brooklyn, NY
- Former Gas Station (1525 Bedford Avenue), Brooklyn, NY
- NYS Brownfield Cleanup Program at 514 West 24th Street, New York, NY
- Gowanus Canal Due Diligence at 76 4th Street, Brooklyn, NY
- Urban Health Plan, Medical Building, NYS Brownfield Cleanup Program CVOC Investigation and Remediation, Bronx, NY
- 420 East 54th Street, NYS Spill Closure, New York, NY
- Equity Residential at 160 Riverside Boulevard, NYS Spill Closure, New York, NY
- 357-359 West Street and 156 Leroy Street, NYC VCP, New York, NY
- Emergency Spill Response at 322 West 57th Street, Investigation and Closure, New York, NY

New York Building Congress – Energy Committee

- Hurricane Sandy, Emergency Response at 21 West Street, New York, NY
- Hurricane Sandy, Emergency Response at 71 Pine Street, New York, NY
- Greenpoint Landing, NYC E-Designation, Brooklyn, NY
- 23-01 42nd Road, NYS Brownfield Cleanup Program, Long Island City, NY
- Greenpoint Waterfront Development, NYS Brownfield Cleanup Program, Brooklyn, NY
- 125th Street and Lenox Avenue, NYC VCP, New York, NY
- Whitehead Realty Solvent Site, Inactive Hazardous Waste site, CVOC, Investigation and Remediation, Brooklyn, NY
- SunCap Property Group Environmental On-Call Consulting, Various Locations, Nationwide
- Con Edison, Underground Storage Tank On-Call Contract, Five Boroughs of New York City, NY
- Con Edison, Construction Inspections On-Call Contract, Five Boroughs of New York City, NY
- Con Edison, Appendix B Spill Sites On-Call Contract, Five Boroughs of New York City, NY
- Meeker Avenue Plume Trackdown Site, Brooklyn, NY
- Distribution Facility, Superfund Redevelopment, Long Island City, NY
- Edison Properties, West 17th Street Development Site (Former MGP Site), New York, NY
- Con Edison, Governors Island Dielectric Fluid Spill, Investigation and Remediation, New York, NY
- 144-150 Barrow Street, NYS Brownfield Cleanup Program, New York, NY
- West 17th Street Development, NYS Brownfield Cleanup Program, MGP Investigation and Remediation, New York, NY
- Montefiore Medical Center, Emergency Response, PCB Remediation, Bronx, NY
- New York University, 4 Washington Square Village Fuel Oil Remediation, New York, NY
- NYCSCA, Proposed New York City School Construction Sites, Five Boroughs of New York City, NY
- Con Edison, East 60th Street Generating Station, New York, NY
- Residential Building at 82 Irving Place, Environmental Remediation, New York, NY
- 1113 York Avenue, Storage Tank Closures, New York, NY
- Peter Cooper Village/Stuyvesant Town, Phase I ESA, New York, NY
- Superior Ink, Waste Characterization and Remedial Action Plans, New York, NY
- Bronx Mental Health Redevelopment Project, Phase I ESA, Bronx, NY
- 2950 Atlantic Avenue, Site Characterization Investigation, Brooklyn, NY
- Con Edison, East 74th Street Generating Station, Sediment Investigation, New York, NY
- Con Edison, First Avenue Properties, New York, NY
- Queens West Development Corp. Stage II, Long Island City, NY
- Article X Project Environmental Reviews, Various New York State Electrical Generation Sites, NY
- Poletti Generating Station, Astoria, NY

- Arthur Kill Generating Station, Staten Island, NY
- Distribution Facility, Phase I & Phase II ESA and Regulatory Compliance, Bohemia, NY
- Huntington Station Superfund Due Diligence, Huntington Station, NY
- Garvies Point Bulkhead, Glen Cove, NY
- Johnson & Hoffman Metal Stamping Facility, Environmental Compliance, Carle Place, NY
- Floral Park Storage Facility, Phase I and Phase II ESA
- Garden City Phase I ESAs at two sites, including part of a Superfund Site, Garden City, NY
- Huntington Station Storage Facility, Phase I and II ESA, Huntington Station, NY
- Trevor Day School, NYS Spill Site Expert Testimony, New York, NY
- 320 West Fordham Road, Bronx, NY
- Bedford Union Armory, NYS Brownfield Cleanup Program, Brooklyn, NY

SELECTED PUBLICATIONS, REPORTS, AND PRESENTATIONS

Burke, M., Ciambruschini, S., Nicholls, G., Tashji, A., Vaidya, S., “Redeveloping a Remediated MGP Site”, MGP Symposium 2019, Atlantic City, NJ.

BRIAN GOCHENAUR, QEP

ASSOCIATE

ENVIRONMENTAL SCIENTIST

Mr. Gochenaur is an environmental project manager with 20 years of experience in environmental due diligence, site investigation and remediation, fuel oil storage tank investigation and removal, soil vapor intrusion assessments, in-situ remedial technology, spill closure, vapor barrier and sub-slab depressurization system design and construction, emergency response, environmental and geotechnical site investigations, and health and safety monitoring. He has extensive experience with the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup, Voluntary Cleanup and Spill Programs and New York City Department of Environmental Protection (NYCDEP) "E" Designated and New York City Voluntary Cleanup Program (BCP) sites. His areas of expertise include Phase I Environmental Site Assessments, Phase II Site Investigations, and environmental consulting and oversight on large scale construction projects.



EDUCATION

B.S., Environmental Science
University of Florida

PROFESSIONAL REGISTRATION

Qualified Environmental Professional (QEP) certified by the Institute of Professional Environmental Practice

40-Hour OSHA (HAZWOPER)

SELECTED PROJECTS

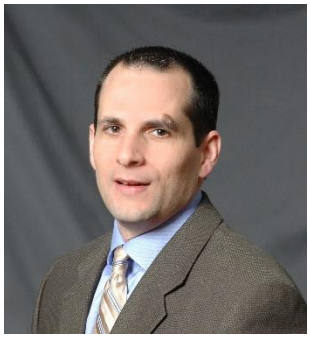
- 440 Washington Street, E-Designated services, New York, NY
- 3514 Surf Avenue, Tall Residential and Retail Building, Brooklyn, NY
- ARO 242 West 53, Tall Residential Building, New York, NY
- NY Aquarium Shark Exhibit, Soil Characterization and Excavation Oversight, Coney Island Neighborhood, Brooklyn, NY
- 60 West Street, Site Investigation and Redevelopment, Brooklyn, NY
- 535 4th Avenue, BCP Auto Repair Cleanup and Redevelopment, Brooklyn, NY
- 1525 Bedford Avenue, BCP Gas Station Cleanup and Redevelopment, Brooklyn, NY
- 220 Eleventh Avenue, Residential Building, New York, NY
- 432 Rodney Street, Residential Building, Brooklyn, NY
- 563 Sackett Street, Brooklyn, NY
- 362 West 125th Street, Residential Building, New York, NY
- Bedford Armory Redevelopment, Brooklyn, NY
- 268 West Street, BCP Redevelopment of Former Commercial and Industrial Site, New York, NY
- 110 125th Street, Soil Excavation and Remediation, New York, NY
- Former Roseland Ballroom Redevelopment, Soil Characterization and Excavation Oversight, New York, NY
- 42 Crosby Street, "E" Designated Site Investigation and Remediation, New York, NY
- New York School Construction Authority, Various Locations, In-House Environmental Consulting, Five Boroughs of New York City
- EZ Serve Portfolio, GE Capital, Various Phase II Site Investigations, FL, GA, LA, and MS
- Beth Elohim Child Daycare Center, Lead Based Paint Abatement, Brooklyn, NY
- Price Battery, Environmental Protection Agency (EPA) Lead Fallout Superfund Site, Hamburg, PA

- Clark Portfolio, GE Capital, Various Phase II Locations, MI, IL, ID, and OH
- Tops Plaza Portfolio, Prudential Real Estate Investors, Various Phase II Locations, NY
- Cingular Wireless Portfolio, Cingular Wireless, Various Locations Phase I and II Locations, WA
- Queens Center Mall Expansion, Remedial Oversight, Elmhurst, NY
- Soka Gakkai International-USA, Cultural Center, Brooklyn, NY
- 1752 Shore Parkway, Environmental Remediation, Brooklyn, NY
- Bedford Union Armory, NYS Brownfield Cleanup Program, Brooklyn, NY
- NYCEDC Manhattan Greenway – Harlem River, New York, NY
- 445 Gerard Avenue, Residential Building, Bronx, NY

ANTHONY MOFFA, JR., ASP, CHMM, COSS, CSP

ASSOCIATE
CORPORATE HEALTH AND SAFETY MANAGER

Anthony is Langan's Corporate Health & Safety Manager and is responsible for managing health and safety compliance in all Langan office locations. He has 29 years of experience in the health and safety field. He is responsible for ensuring compliance with all federal and state occupational health and safety laws and development and implementation of corporate health and safety policies. His responsibilities include reviewing and updating Langan's Corporate Health and Safety Program and assisting employees in the development of site specific Health & Safety Plans. He maintains and manages health and safety records for employees in all Langan office locations including medical evaluations, respirator fit testing, and Hazardous Waste Operations and Emergency Response training. He is also responsible for documentation and investigation of work-related injuries and incidents and sharing this information with employees to assist in the prevention of future incidents. He is also the chairman of the Corporate Health & Safety Committee and Health & Safety Leadership Team that meet periodically throughout the year. He is responsible for coordinating and providing health and safe training to Langan employees. He was formerly the Environmental, Health and Safety Coordinator at a chemical manufacturer. His experience included employee hazard communications, development of material safety data sheets for developed products, respirator fit testing and conducting required Occupational Health & Safety Association and Department of Transportation training.



EDUCATION

B.S., Physics
West Chester University

PROFESSIONAL REGISTRATION

Associate Safety Professional (ASP)

Certified Hazardous Material Manager (CHMM)

Certified Occupational Safety Specialist (COSS)

Certified Safety Professional (CSP)

AFFILIATIONS

Pennsylvania Chamber of Business & Industry

Chemical Council of New Jersey

New Jersey Business & Industry Association

American Society of Safety Professionals

LAMEES ESMAIL, EIT

PROJECT ENGINEER

ENVIRONMENTAL ENGINEERING

Ms. Esmail is a civil and environmental engineer with four years of experience supporting environmental oversight and remediation projects in New York City. She has performed environmental field work including preparing daily inspection reports, photo documentation of work, and reviewing contractor submittals. She currently performs site research, manages field oversight, reviews/approves contractor submittals, prepares reports, and is involved with remedial design, implementation and project management.

Prior to joining Langan, Ms. Esmail gained three years of experience supporting environmental permitting and erosion and sedimentation control primarily for linear overhead transmission line projects. Types of permits included state land disturbance approvals and Army Corps of Engineers Section 10 Pre-Construction Notifications. Ms. Esmail also has experience aiding with the siting of new substation properties, using ArcGIS and AutoCAD to compile data for potential sites.



EDUCATION

B.S., Civil Engineering (Environmental Concentration)
George Washington University

PROFESSIONAL REGISTRATION

Engineer in Training (EIT) in NC

SELECTED PROJECTS

- Con Edison Partial Replacement of 345KV Feeders M51 & M52 Feasibility Study, New York, NY
- 220 Eleventh Avenue, Hudson Arts Building, New York, NY
- 50 Hudson Yards, Supertall Office Building, New York, NY
- 215 North 10th Street, Brooklyn, NY
- 320 West 135th Street, New York, NY
- 163 Varick Street, New York, NY
- 39 West 23rd Street, New York, NY
- 1 Huron Street, Brooklyn, NY
- Bedford Armory, Brooklyn, NY
- 1607 Surf Avenue, Brooklyn, NY
- 414 Gerard Avenue, Bronx, NY
- 445 Gerard Avenue, Bronx, NY
- 326-350 Rockaway Avenue, Brooklyn, NY
- 197-201 Canal Street, Staten Island, NY
- 475 Bay Street, Staten Island, NY
- Astoria Steel, Queens, NY
- 99 Hudson Boulevard, New York, NY
- 4650 Broadway, New York, NY
- 12-57 57th Street, Brooklyn, NY
- 805-825 Atlantic Avenue, Brooklyn, NY
- Various Phase I Environmental Site Assessments (ESAs) in NYC

SELECTED PUBLICATIONS, REPORTS, AND PRESENTATIONS

Esmail, L., “Transmission Line Erosion Control and Construction Specifications”, Duke Energy Progress Transmission Erosion and Sedimentation Control Seminar, Raleigh, NC, November 2016.

MEGHAN ARONICA, EIT

SENIOR STAFF ENGINEER

ENVIRONMENTAL ENGINEERING

Ms. Aronica is an environmental engineer with 3.5 years of experience in environmental engineering and remediation in New York and Tennessee. Ms. Aronica has experience in field investigation implementation and coordination, performing daily field inspections, photo documentation of work, leading tailgate safety talks, reviewing/approving contractor submittals, insuring contractors are in compliance with construction and remediation documents, reviewing subcontractor invoices, preparing regulatory reports, construction oversight, due diligence report writing, field implementations and senior engineer engineering support. Ms. Aronica is experienced in several computer design and drafting programs, including AutoCAD Civil 3D, and software such as Microsoft Word and Excel.

Her recent field experiences include performing monthly operation and maintenance inspections for a soil vapor extraction (SVE) system, performing quarterly sampling using a passive diffusion bag (PDB), performing a sub-membrane depressurization (SMD) system inspection, collection of field sampling, such as soil, groundwater, and soil vapor samples, and performing remedial oversight. Office responsibilities include regulatory report writing, writing Phase I Environmental Site Assessments (ESA), writing Final Engineering Reports and Site Management Plans (SMPs), field investigation coordination, and day-to-day construction oversight support.

SELECTED PROJECTS

- Con Edison Construction Inspections, Queens Feeder Enhancement, Queens, NY
- Astoria Steel, Construction Oversight and CAMP, Astoria, NY
- Bedford Armory, Construction Oversight and CAMP, Brooklyn, NY
- NYU CoGen Expansion, Construction Oversight, New York, NY
- Greenpoint Landing Block D, Construction Oversight, Brooklyn, NY
- 266 West 96th Street, Remedial Investigation and Construction Oversight, New York, NY
- 241 West 28th Street, Underground Storage Tank Closure, Construction Oversight, CAMP, New York, NY.
- 2330 Broadway, Construction Oversight, Construction Oversight, New York, NY
- 320 West 31st Street, Remedial Investigation, New York, NY
- 475 Bay Street, Spill Delineation, Remedial Investigation, Underground Storage Tank Closure, Construction Oversight, SMP, FER, Staten Island, NY
- 1607 Surf Avenue, SMP and FER, Brooklyn, NY
- 805-825 Atlantic Avenue, Groundwater Sampling, Brooklyn, New York
- Bay Crane Sites, Remedial Investigation, Brooklyn, NY



EDUCATION

B.S., Environmental Engineering
State University of New York at Buffalo

PROFESSIONAL REGISTRATION

Engineer-in-Training (EIT) in NY

AFFILIATIONS

Society of Women Engineers

WILLIAM BOHRER, PG

PROJECT GEOLOGIST

GEOLOGIST

Mr. Bohrer is an experienced geologist responsible for managing Langan's environmental standards and Health and Safety compliance for projects throughout New York City. His services include dissemination of environmental protocols, troubleshooting at project sites, in-house/field training, and maintenance of quality standards across the environmental discipline. Mr. Bohrer has a diverse and extensive background in geophysics, hydrogeology, mining and petroleum, and geotechnical engineering. He has developed conceptual site models for public, industrial and commercial facilities nationwide.



SELECTED PROJECTS

- NYU Poly – 122 Johnson Street, Brooklyn, NY
- Con Edison of New York at Governor's Island, NY, NY
- 535 4th Avenue, Brooklyn, NY
- 27 Wooster Street, New York, NY
- 42 West Street, Brooklyn, NY
- 455 West 19th Street, New York, NY
- Kings Plaza Mall, Brooklyn, NY
- Hudson Yards "Terra Firma," New York, NY
- Hudson Yards, Platform Special Inspection, New York, NY
- PSAC II, Bronx, NY
- 595-647 Smith Street, Brooklyn, NY
- New York University, 7-13 Washington Square North Investigation, New York, NY
- NYU 4 Washington Square Village, New York, NY
- 125th Street and Lenox Avenue, New York, NY
- Sullivan Street Development, New York, NY
- Hudson Crossing II, New York, NY
- New York Aquarium, Shark Tank & Animal Care Facility, Brooklyn, NY
- 209-219 Sullivan Street, New York, NY
- 261 Hudson Street, New York, NY
- 460 Washington Street, New York, NY
- 552 West 24th Street, New York, NY
- Brooklyn Bridge Park Pier 1, New York, NY
- International Leadership Bronx Charter School, Bronx, NY
- 203 East 92nd Street, New York, NY
- HighLine 28-29, New York, NY
- 539 Smith Street Bulkhead, Brooklyn, NY
- Willets Point, Corona, NY
- Plume Migration and Fracture Flow Aquifer Investigation, Brunswick, MD
- Plume Migration and Fracture Flow Aquifer Investigation, Fallston, MD
- Emergency Response Site Investigation & Remediation, Wappingers Falls, NY
- Emergency Response Site Investigation & Remediation, Allentown, PA

EDUCATION

Post Graduate Studies in Geophysics
Cornell University

B.S., Geology
Tufts University

PROFESSIONAL REGISTRATION

Professional Geologist (PG) in NY

40 Hour OSHA HazWOPER

OSHA Construction Safety & Health

OSHA Supervisory Certification Credential (TWIC)

Transportation Worker Identification

NYS DEC- Protecting New York's Natural Resources with Better Construction Site Management

AFFILIATIONS

American Association of Petroleum Geologists

National Groundwater Association

Geological Society of America

LANGAN

JOSEPH CONBOY

STAFF CHEMIST

ENVIRONMNETAL

Mr. Conboy has seven years of environmental chemistry, quality assurance, and environmental database management experience, with a current emphasis on validation of laboratory data for submittal to NJDEP via the New Jersey Data of Known Quality Protocols and to NYSDEC. Previous work experience includes performing validation of data for projects in USEPA Regions 2 and 3 while employing appropriate validation guidelines for each region, managing large data sets, updating appropriate regulatory limits, performing statistical evaluations, and preparing electronic data deliverables and report deliverables using the Earthsoft EQuIS database program, and acted as an intermediary between project managers, field staff, and laboratories. Mr. Conboy also has experience in field sampling techniques and maintains current OSHA HAZWOPER certification.



SELECTED PROJECTS

- 1400 Ferris, Bronx, NY – Completed validation of soil and groundwater data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOCs and SVOCs including 1,4-dioxane, and tangentially used based on professional judgment to perform validation of PFAS data.
- Broome Street Parking Lot, NY - Completed validation of waste characterization data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOCs, SVOCs, herbicides, PCBs, pesticides, metals including mercury, ignitability temperature, pH, reactive cyanide, reactive sulfide, cyanide, and hexavalent chromium. Toxicity characteristic leachate procedure extraction data for VOCs, SVOCs, herbicides, pesticides, metals, and mercury were also validated.
- 215 North 10th Street, Brooklyn, NY - Completed validation of soil and groundwater data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOC, SVOC, SVOC SIM, herbicide, PCB, pesticide, metals, mercury, cyanide, hexavalent chromium, trivalent chromium data.
- 35 Commercial Street, Brooklyn, NY - Completed validation of soil data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOC, SVOC, SVOC SIM, herbicide, PCB, pesticide, metals, mercury, cyanide, hexavalent chromium, trivalent chromium data, and tangentially used based on professional judgment to perform validation of PFAS data.

EDUCATION

B.Sc., Chemistry with a minor in Mathematics
Rowan University

CERTIFICATIONS & TRAINING

OSHA 40-Hour HAZWOPER 29 CFR 1910.120(e)(4) Certification

NJ Analytical Guidance and Data Usability Training

USEPA Data Validation Training

Earthsoft EQuIS Environmental Database Training

CAROLINE DEVIN

SENIOR STAFF ENGINEER

ENVIRONMENTAL ENGINEERING

Ms. Devin is a senior staff environmental engineer with over three years of experience in environmental consulting in the New York metropolitan area. Ms. Devin has a background in construction monitoring, daily field inspections, environmental site assessments, remedial investigations, sample collection, report writing, and vapor mitigation system design, installation and management.



EDUCATION

B.S., Environmental Engineering
Cornell University

PROFESSIONAL REGISTRATION

10-Hour OSHA

40-Hour OSHA HAZWOPER

SELECTED PROJECTS

- 473 President Street and President Street Portfolio, Construction Oversight and Remedial Systems, Vapor Collection Installation Oversight and Reporting, Brooklyn NY
- 514 Union Street, Vapor Mitigation System Installation and Indoor Air Sampling, SMD System Inspections, Brooklyn, NY
- 305 Nevins Street, Air Sparge, SVE and SMD System Installation Oversight and Management, Brooklyn, NY
- Mayer Malbin Sites, Phase I Due Diligence Reporting, Phase II Investigation Reporting and Management, Queens, NY
- 805-825 Atlantic Avenue, SMD Inspections and Sampling, Quarterly Groundwater Sampling with Passive Diffusion, Periodic Review Reporting (PRR), Brooklyn, NY
- Gowanus Canal Northside, Remedial Construction Oversight and Management, Brooklyn, NY
- 175 Fifth Avenue – Flatiron Building Renovation, NYCOER Compliance, Air Quality/Noise Reporting Flatiron Building Renovation, New York, NY
- 175-225 Third Street, SMD Inspections, Grossly Contaminated Materials Investigation and Reporting, Brooklyn, NY
- 250 Water Street, Remedial Delineation Investigation and Oversight, New York, NY
- 27-01 Jackson Avenue, Remedial Oversight Support, Quarterly Groundwater Monitoring Reports, Long Island City, NY
- 26-32 Jackson Avenue, NY, Remedial Oversight Support, Long Island City
- West Fordham Road, Phase II Investigation and Reporting, Bronx, NY
- 159 Boerum Street, Remedial Oversight Support, Brooklyn, NY
- Staten Island Ballpark, Remedial Oversight Support, Staten Island, NY
- East Adams Redevelopment, Due Diligence Phase I Inspection, Remedial Investigation and Reporting, Syracuse, NY
- 23-15 44th Road, Long Island City, NY

SELECTED PUBLICATIONS, REPORTS, AND PRESENTATIONS

Tentori, Wang, Devin, Richardson “Treatment of Anaerobic Digester Liquids via Membrane Biofilm Reactors: Simultaneous Aerobic Methanotrophy and Nitrogen Removal”.

MARLA MILLER, PE, BCEE

SENIOR PROJECT ENGINEER

ENVIRONMENTAL ENGINEERING

Ms. Miller has over 19 years of experience managing site characterization and remediation projects. She is a senior environmental engineer experienced in environmental permitting, industrial pretreatment, compliance monitoring, and water quality evaluation. She has a strong background in data validation, laboratory analyses, and sampling procedures for soil, water, and air matrices. Her expertise in data interpretation includes natural attenuation monitoring, petroleum hydrocarbon chromatography, and aqueous geochemistry.



SELECTED PROJECTS

Data Validation

- St. Joseph's Parish Redevelopment Data Quality Assessment (DQA) and Data Usability (DUE) preparation, New York, NY
- 175 – 225 3rd Street Data Usability Summary Report (DUSR), Brooklyn, NY
- 805 – 825 Atlantic Ave DUSR, Brooklyn, NY
- John Evans Superfund Site DUSR, Lansdale, PA
- 50 North Road (Nokia Chester), DQA and DUE preparation, Chester, NJ
- Data Validation/Data Management for Brownfields Site Assessment, Port St. Joe, FL*

Industrial Wastewater Pretreatment

- Industrial Wastewater Discharge Limit Development, Inland Empire Utilities Agency (IEUA), CA*
- Local Limits Study, Hopewell, VA*
- Local Limits Study, Mesa, AZ*
- Local Limits Development and Sewer Use Ordinance Development, Prescott, AZ*
- Implementation of Industrial Pretreatment Program, Prescott, AZ*
- Industrial Pretreatment Development, Queen Creek, AZ*
- Selenium Wastewater Treatment Options for Meat Packing Facility, Tolleson, AZ*
- Arizona Pollutant Discharge Elimination System (AZPDES) Permit Application Preparation, Phoenix, AZ
- Preparation of Sampling and Analysis Plan for Sub-Regional Operating Group (SROG) Local Limits Development, Phoenix and Surrounding Cities, AZ

EDUCATION

M.S., Environmental Engineering
University of California, Berkeley

B.S., Biology
Loyola Marymount University

PROFESSIONAL REGISTRATION

Professional Engineer (PE) in AZ

Board Certified Environmental Engineer (BCEE) – Hazardous Waste Management (09-10019)

CERTIFICATIONS

The Wastewater Treatment, Wastewater Collection, and Water Distribution Operator Certification

Grade 2
Water Treatment Operator Certification Grade 1

Backflow Tester Certification (AABP)

*Denotes projects performed prior to employment at Langan

Site Investigation/Remediation/Compliance

- Arizona Electric Power Cooperative (AEPCO) Apache Generating Station Arizona Protection Permit (APP), Wilcox, AZ
- Arizona Department of Environmental Quality (ADEQ) Water Quality Assurance Revolving Fund (WQARF) Projects, Phoenix and Gilbert, AZ
- Long-Term Monitoring Program and 5-Year CERCLA Review, Luke Air Force Base (AFB), Glendale, AZ*
- Development of Stormwater Prevention Pollution Plan (SWPPP) and Stormwater Flow Modeling, Luke AFB, Glendale, AZ*
- Site Investigation and Clean Closure for Confidential Industrial Client, Tempe, AZ*
- RCRA Facility Investigation/Corrective Measures Assessment, San Jose, CA*
- Technical Resource for X-Ray Fluorescence (XRF) Field Screening Program for Former Small Arms Firing Range, Nogales, AZ*
- Designed and Implemented Sampling Procedures for Volatile Emissions from Tailings Impoundment Using Flux Chambers, Henderson, CO*
- Conceptual Site Model and Statistical Evaluation for Water Treatment Plant, Denver, CO*

Mining Project

- Third-Party Construction Quality Assurance (CQA) for Geotextile-Lined Tailings Repository, Casa Grande, AZ*
- CQA For Reclamation at Smelter, Miami, AZ*
- XRF Field Screening for Excavation at Former Smelter Site, El Paso, TX*
- CQA for Reclamation Projects at Active Smelter, Miami, AZ

ATTACHMENT B

LABORATORY REPORTING LIMITS AND METHOD DETECTION LIMITS

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Langan Engineering & Environmental

TCL Volatiles - EPA 8260D/5035 High&Low (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - 1 Vial MeOH/2 Vial Water

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Methylene chloride	75-09-2	10	0.816	ug/kg	70-130	30	70-130	30	30			
1,1-Dichloroethane	75-34-3	1.5	0.2952	ug/kg	70-130	30	70-130	30	30			
Chloroform	67-66-3	1.5	0.3246	ug/kg	70-130	30	70-130	30	30			
Carbon tetrachloride	56-23-5	1	0.2112	ug/kg	70-130	30	70-130	30	30			
1,2-Dichloropropane	78-87-5	3.5	0.255	ug/kg	70-130	30	70-130	30	30			
Dibromochloromethane	124-48-1	1	0.3078	ug/kg	70-130	30	70-130	30	30			
1,1,2-Trichloroethane	79-00-5	1.5	0.393	ug/kg	70-130	30	70-130	30	30			
Tetrachloroethene	127-18-4	1	0.3062	ug/kg	70-130	30	70-130	30	30			
Chlorobenzene	108-90-7	1	0.1862	ug/kg	70-130	30	70-130	30	30			
Trichlorofluoromethane	75-69-4	5	0.3914	ug/kg	70-139	30	70-139	30	30			
1,2-Dichloroethane	107-06-2	1	0.2274	ug/kg	70-130	30	70-130	30	30			
1,1,1-Trichloroethane	71-55-6	1	0.2698	ug/kg	70-130	30	70-130	30	30			
Bromodichloromethane	75-27-4	1	0.3848	ug/kg	70-130	30	70-130	30	30			
trans-1,3-Dichloropropene	10061-02-6	1	0.3006	ug/kg	70-130	30	70-130	30	30			
cis-1,3-Dichloropropene	10061-01-5	1	0.2672	ug/kg	70-130	30	70-130	30	30			
1,1-Dichloropropene	563-58-6	5	0.4556	ug/kg	70-130	30	70-130	30	30			
Bromoform	75-25-2	4	0.4954	ug/kg	70-130	30	70-130	30	30			
1,1,2,2-Tetrachloroethane	79-34-5	1	0.2402	ug/kg	70-130	30	70-130	30	30			
Benzene	71-43-2	1	0.2972	ug/kg	70-130	30	70-130	30	30			
Toluene	108-88-3	1.5	0.2416	ug/kg	70-130	30	70-130	30	30			
Ethylbenzene	100-41-4	1	0.2214	ug/kg	70-130	30	70-130	30	30			
Chloromethane	74-87-3	5	0.7832	ug/kg	52-130	30	52-130	30	30			
Bromomethane	74-83-9	2	0.6478	ug/kg	57-147	30	57-147	30	30			
Vinyl chloride	75-01-4	2	0.7534	ug/kg	67-130	30	67-130	30	30			
Chloroethane	75-00-3	2	0.4384	ug/kg	50-151	30	50-151	30	30			
1,1-Dichloroethene	75-35-4	1	0.2598	ug/kg	65-135	30	65-135	30	30			
trans-1,2-Dichloroethene	156-60-5	1.5	0.3916	ug/kg	70-130	30	70-130	30	30			
Trichloroethene	79-01-6	1	0.224	ug/kg	70-130	30	70-130	30	30			
1,2-Dichlorobenzene	95-50-1	5	0.3642	ug/kg	70-130	30	70-130	30	30			
1,3-Dichlorobenzene	541-73-1	5	0.3996	ug/kg	70-130	30	70-130	30	30			
1,4-Dichlorobenzene	106-46-7	5	0.4198	ug/kg	70-130	30	70-130	30	30			
Methyl tert butyl ether	1634-04-4	2	0.487	ug/kg	66-130	30	66-130	30	30			
p/m-Xylene	179601-23-1	2	0.43	ug/kg	70-130	30	70-130	30	30			
o-Xylene	95-47-6	2	0.4174	ug/kg	70-130	30	70-130	30	30			
cis-1,2-Dichloroethene	156-59-2	1	0.3014	ug/kg	70-130	30	70-130	30	30			
Dibromomethane	74-95-3	10	0.4348	ug/kg	70-130	30	70-130	30	30			
Styrene	100-42-5	2	0.726	ug/kg	70-130	30	70-130	30	30			
Dichlorodifluoromethane	75-71-8	10	0.3888	ug/kg	30-146	30	30-146	30	30			
Acetone	67-64-1	10	3.235	ug/kg	54-140	30	54-140	30	30			
Carbon disulfide	75-15-0	10	0.3754	ug/kg	59-130	30	59-130	30	30			
2-Butanone	78-93-3	10	3.8772	ug/kg	70-130	30	70-130	30	30			
Vinyl acetate	108-05-4	10	0.751	ug/kg	70-130	30	70-130	30	30			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

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Langan Engineering & Environmental

TCL Volatiles - EPA 8260D/5035 High&Low (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - 1 Vial MeOH/2 Vial Water

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
4-Methyl-2-pentanone	108-10-1	10	0.8164	ug/kg	70-130	30	70-130	30	30			
1,2,3-Trichloropropane	96-18-4	10	0.387	ug/kg	68-130	30	68-130	30	30			
2-Hexanone	591-78-6	10	0.3964	ug/kg	70-130	30	70-130	30	30			
Bromochloromethane	74-97-5	5	0.3022	ug/kg	70-130	30	70-130	30	30			
2,2-Dichloropropane	594-20-7	5	0.795	ug/kg	70-130	30	70-130	30	30			
1,2-Dibromoethane	106-93-4	4	0.4088	ug/kg	70-130	30	70-130	30	30			
1,3-Dichloropropane	142-28-9	5	0.5656	ug/kg	69-130	30	69-130	30	30			
1,1,1,2-Tetrachloroethane	630-20-6	1	0.3284	ug/kg	70-130	30	70-130	30	30			
Bromobenzene	108-86-1	5	0.2202	ug/kg	70-130	30	70-130	30	30			
n-Butylbenzene	104-51-8	1	0.3144	ug/kg	70-130	30	70-130	30	30			
sec-Butylbenzene	135-98-8	1	0.2756	ug/kg	70-130	30	70-130	30	30			
tert-Butylbenzene	98-06-6	5	0.6032	ug/kg	70-130	30	70-130	30	30			
o-Chlorotoluene	95-49-8	5	0.313	ug/kg	70-130	30	70-130	30	30			
p-Chlorotoluene	106-43-4	5	0.3608	ug/kg	70-130	30	70-130	30	30			
1,2-Dibromo-3-chloropropane	96-12-8	5	0.8366	ug/kg	68-130	30	68-130	30	30			
Hexachlorobutadiene	87-68-3	5	0.4582	ug/kg	67-130	30	67-130	30	30			
Isopropylbenzene	98-82-8	1	0.177	ug/kg	70-130	30	70-130	30	30			
p-Isopropyltoluene	99-87-6	1	0.2732	ug/kg	70-130	30	70-130	30	30			
Naphthalene	91-20-3	5	0.7696	ug/kg	70-130	30	70-130	30	30			
Acrylonitrile	107-13-1	10	0.3756	ug/kg	70-130	30	70-130	30	30			
n-Propylbenzene	103-65-1	1	0.284	ug/kg	70-130	30	70-130	30	30			
1,2,3-Trichlorobenzene	87-61-6	5	0.4034	ug/kg	70-130	30	70-130	30	30			
1,2,4-Trichlorobenzene	120-82-1	5	0.7898	ug/kg	70-130	30	70-130	30	30			
1,3,5-Trimethylbenzene	108-67-8	5	0.6016	ug/kg	70-130	30	70-130	30	30			
1,2,4-Trimethylbenzene	95-63-6	5	0.573	ug/kg	70-130	30	70-130	30	30			
1,4-Dioxane	123-91-1	100	17.4	ug/kg	65-136	30	65-136	30	30			
1,4-Diethylbenzene	105-05-5	4	0.2	ug/kg	70-130	30	70-130	30	30			
4-Ethyltoluene	622-96-8	4	0.097	ug/kg	70-130	30	70-130	30	30			
1,2,4,5-Tetramethylbenzene	95-93-2	4	0.181	ug/kg	70-130	30	70-130	30	30			
Ethyl ether	60-29-7	5	0.3798	ug/kg	67-130	30	67-130	30	30			
trans-1,4-Dichloro-2-butene	110-57-6	5	1.478	ug/kg	70-130	30	70-130	30	30			
1,2-Dichloroethane-d4	*17060-07-0*									*70-130*		
2-Chloroethoxyethane												
Toluene-d8	*2037-26-5*									*70-130*		
4-Bromofluorobenzene	*460-00-4*									*70-130*		
Dibromofluoromethane	*1868-53-7*									*70-130*		

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NYTCL Semivolatiles - EPA 8270E (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Acenaphthene	83-32-9	133.6	17.3012	ug/kg	31-137	50	31-137	50	50			
1,2,4-Trichlorobenzene	120-82-1	167	19.1048	ug/kg	38-107	50	38-107	50	50			
Hexachlorobenzene	118-74-1	100.2	18.704	ug/kg	40-140	50	40-140	50	50			
Bis(2-chloroethyl)ether	111-44-4	150.3	22.6452	ug/kg	40-140	50	40-140	50	50			
2-Chloronaphthalene	91-58-7	167	16.5664	ug/kg	40-140	50	40-140	50	50			
1,2-Dichlorobenzene	95-50-1	167	29.9932	ug/kg	40-140	50	40-140	50	50			
1,3-Dichlorobenzene	541-73-1	167	28.724	ug/kg	40-140	50	40-140	50	50			
1,4-Dichlorobenzene	106-46-7	167	29.1582	ug/kg	28-104	50	28-104	50	50			
3,3'-Dichlorobenzidine	91-94-1	167	44.422	ug/kg	40-140	50	40-140	50	50			
2,4-Dinitrotoluene	121-14-2	167	33.4	ug/kg	40-132	50	40-132	50	50			
2,6-Dinitrotoluene	606-20-2	167	28.6572	ug/kg	40-140	50	40-140	50	50			
Fluoranthene	206-44-0	100.2	19.1716	ug/kg	40-140	50	40-140	50	50			
4-Chlorophenyl phenyl ether	7005-72-3	167	17.869	ug/kg	40-140	50	40-140	50	50			
4-Bromophenyl phenyl ether	101-55-3	167	25.4842	ug/kg	40-140	50	40-140	50	50			
Bis(2-chloroisopropyl)ether	108-60-1	200.4	28.5236	ug/kg	40-140	50	40-140	50	50			
Bis(2-chloroethoxy)methane	111-91-1	180.36	16.7334	ug/kg	40-117	50	40-117	50	50			
Hexachlorobutadiene	87-68-3	167	24.4488	ug/kg	40-140	50	40-140	50	50			
Hexachlorocyclopentadiene	77-47-4	477.62	151.302	ug/kg	40-140	50	40-140	50	50			
Hexachloroethane	67-72-1	133.6	27.0206	ug/kg	40-140	50	40-140	50	50			
Isophorone	78-59-1	150.3	21.6766	ug/kg	40-140	50	40-140	50	50			
Naphthalene	91-20-3	167	20.3406	ug/kg	40-140	50	40-140	50	50			
Nitrobenzene	98-95-3	150.3	24.716	ug/kg	40-140	50	40-140	50	50			
NitrosoDiPhenylAmine(NDPA)/DPA	86-30-6	133.6	19.0046	ug/kg	36-157	50	36-157	50	50			
n-Nitrosodi-n-propylamine	621-64-7	167	25.7848	ug/kg	32-121	50	32-121	50	50			
Bis(2-Ethylhexyl)phthalate	117-81-7	167	57.782	ug/kg	40-140	50	40-140	50	50			
Butyl benzyl phthalate	85-68-7	167	42.084	ug/kg	40-140	50	40-140	50	50			
Di-n-butylphthalate	84-74-2	167	31.6632	ug/kg	40-140	50	40-140	50	50			
Di-n-octylphthalate	117-84-0	167	56.78	ug/kg	40-140	50	40-140	50	50			
Diethyl phthalate	84-66-2	167	15.4642	ug/kg	40-140	50	40-140	50	50			
Dimethyl phthalate	131-11-3	167	35.07	ug/kg	40-140	50	40-140	50	50			
Benzo(a)anthracene	56-55-3	100.2	18.8042	ug/kg	40-140	50	40-140	50	50			
Benzo(a)pyrene	50-32-8	133.6	40.748	ug/kg	40-140	50	40-140	50	50			
Benzo(b)fluoranthene	205-99-2	100.2	28.1228	ug/kg	40-140	50	40-140	50	50			
Benzo(k)fluoranthene	207-08-9	100.2	26.72	ug/kg	40-140	50	40-140	50	50			
Chrysene	218-01-9	100.2	17.368	ug/kg	40-140	50	40-140	50	50			
Acenaphthylene	208-96-8	133.6	25.7848	ug/kg	40-140	50	40-140	50	50			
Anthracene	120-12-7	100.2	32.565	ug/kg	40-140	50	40-140	50	50			
Benzo(ghi)perylene	191-24-2	133.6	19.6392	ug/kg	40-140	50	40-140	50	50			
Fluorene	86-73-7	167	16.2324	ug/kg	40-140	50	40-140	50	50			
Phenanthrene	85-01-8	100.2	20.3072	ug/kg	40-140	50	40-140	50	50			
Dibenzo(a,h)anthracene	53-70-3	100.2	19.3052	ug/kg	40-140	50	40-140	50	50			
Indeno(1,2,3-cd)Pyrene	193-39-5	133.6	23.2798	ug/kg	40-140	50	40-140	50	50			

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NYTCL Semivolatiles - EPA 8270E (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Pyrene	129-00-0	100.2	16.5998	ug/kg	35-142	50	35-142	50	50			
Biphenyl	92-52-4	380.76	21.71	ug/kg	37-127	50	37-127	50	50			
4-Chloroaniline	106-47-8	167	30.394	ug/kg	40-140	50	40-140	50	50			
2-Nitroaniline	88-74-4	167	32.1976	ug/kg	47-134	50	47-134	50	50			
3-Nitroaniline	99-09-2	167	31.4962	ug/kg	26-129	50	26-129	50	50			
4-Nitroaniline	100-01-6	167	69.138	ug/kg	41-125	50	41-125	50	50			
Dibenzofuran	132-64-9	167	15.7982	ug/kg	40-140	50	40-140	50	50			
2-Methylnaphthalene	91-57-6	200.4	20.1736	ug/kg	40-140	50	40-140	50	50			
Acetophenone	98-86-2	167	20.6746	ug/kg	14-144	50	14-144	50	50			
2,4,6-Trichlorophenol	88-06-2	100.2	31.6632	ug/kg	30-130	50	30-130	50	50			
P-Chloro-M-Cresol	59-50-7	167	24.883	ug/kg	26-103	50	26-103	50	50			
2-Chlorophenol	95-57-8	167	19.7394	ug/kg	25-102	50	25-102	50	50			
2,4-Dichlorophenol	120-83-2	150.3	26.8536	ug/kg	30-130	50	30-130	50	50			
2,4-Dimethylphenol	105-67-9	167	55.11	ug/kg	30-130	50	30-130	50	50			
2-Nitrophenol	88-75-5	360.72	62.792	ug/kg	30-130	50	30-130	50	50			
4-Nitrophenol	100-02-7	233.8	68.136	ug/kg	11-114	50	11-114	50	50			
2,4-Dinitrophenol	51-28-5	801.6	77.822	ug/kg	4-130	50	4-130	50	50			
4,6-Dinitro-o-cresol	534-52-1	434.2	80.16	ug/kg	10-130	50	10-130	50	50			
Pentachlorophenol	87-86-5	133.6	36.74	ug/kg	17-109	50	17-109	50	50			
Phenol	108-95-2	167	25.217	ug/kg	26-90	50	26-90	50	50			
2-Methylphenol	95-48-7	167	25.885	ug/kg	30-130.	50	30-130.	50	50			
3-Methylphenol/4-Methylphenol	106-44-5	240.48	26.1522	ug/kg	30-130	50	30-130	50	50			
2,4,5-Trichlorophenol	95-95-4	167	31.9972	ug/kg	30-130	50	30-130	50	50			
Benzoic Acid	65-85-0	541.08	169.004	ug/kg	10-110	50	10-110	50	50			
Benzyl Alcohol	100-51-6	167	51.102	ug/kg	40-140	50	40-140	50	50			
Carbazole	86-74-8	167	16.2324	ug/kg	54-128	50	54-128	50	50			
1,4-Dioxane	123-91-1	25.05	7.682	ug/kg	40-140	50	40-140	50	50			
2-Fluorophenol	*367-12-4*									*25-120*		
Phenol-d6	*13127-88-3*									*10-120*		
Nitrobenzene-d5	*4165-60-0*									*23-120*		
2-Fluorobiphenyl	*321-60-8*									*30-120*		
2,4,6-Tribromophenol	*118-79-6*									*10-136*		
4-Terphenyl-d14	*1718-51-0*									*18-120*		

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TCL Pesticides - EPA 8081B (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Delta-BHC	319-86-8	1.6008	0.31349	ug/kg	30-150	30	30-150	50	50			
Lindane	58-89-9	0.667	0.298149	ug/kg	30-150	30	30-150	50	50			
Alpha-BHC	319-84-6	0.667	0.189428	ug/kg	30-150	30	30-150	50	50			
Beta-BHC	319-85-7	1.6008	0.60697	ug/kg	30-150	30	30-150	50	50			
Heptachlor	76-44-8	0.8004	0.358846	ug/kg	30-150	30	30-150	50	50			
Aldrin	309-00-2	1.6008	0.563615	ug/kg	30-150	30	30-150	50	50			
Heptachlor epoxide	1024-57-3	3.0015	0.90045	ug/kg	30-150	30	30-150	50	50			
Endrin	72-20-8	0.667	0.27347	ug/kg	30-150	30	30-150	50	50			
Endrin aldehyde	7421-93-4	2.001	0.70035	ug/kg	30-150	30	30-150	50	50			
Endrin ketone	53494-70-5	1.6008	0.412206	ug/kg	30-150	30	30-150	50	50			
Dieldrin	60-57-1	1.0005	0.50025	ug/kg	30-150	30	30-150	50	50			
4,4'-DDE	72-55-9	1.6008	0.370185	ug/kg	30-150	30	30-150	50	50			
4,4'-DDD	72-54-8	1.6008	0.570952	ug/kg	30-150	30	30-150	50	50			
4,4'-DDT	50-29-3	1.6008	1.28731	ug/kg	30-150	30	30-150	50	50			
Endosulfan I	959-98-8	1.6008	0.378189	ug/kg	30-150	30	30-150	50	50			
Endosulfan II	33213-65-9	1.6008	0.534934	ug/kg	30-150	30	30-150	50	50			
Endosulfan sulfate	1031-07-8	0.667	0.317492	ug/kg	30-150	30	30-150	50	50			
Methoxychlor	72-43-5	3.0015	0.9338	ug/kg	30-150	30	30-150	50	50			
Toxaphene	8001-35-2	30.015	8.4042	ug/kg	30-150	30	30-150	50	50			
cis-Chlordane	5103-71-9	2.001	0.557612	ug/kg	30-150	30	30-150	50	50			
trans-Chlordane	5103-74-2	2.001	0.528264	ug/kg	30-150	30	30-150	50	50			
Chlordane	57-74-9	13.34	5.30265	ug/kg	30-150	30	30-150	50	50			
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*		
Decachlorobiphenyl	*2051-24-3*									*30-150*		

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Herbicides -EPA 8151A (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
2,4-D	94-75-7	0.1665	0.0104895	mg/kg	30-150	30	30-150	30	30			
2,4,5-T	93-76-5	0.1665	0.0051615	mg/kg	30-150	30	30-150	30	30			
2,4,5-TP (Silvex)	93-72-1	0.1665	0.0044289	mg/kg	30-150	30	30-150	30	30			
DCAA	*19719-28-9*									*30-150*		

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TCL PCBs - EPA 8082A (SOIL)

Holding Time: 365 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Aroclor 1016	12674-11-2	50	4.44	ug/kg	40-140	50	40-140	50	50			
Aroclor 1221	11104-28-2	50	5.01	ug/kg	40-140	50	40-140	50	50			
Aroclor 1232	11141-16-5	50	10.6	ug/kg	40-140	50	40-140	50	50			
Aroclor 1242	53469-21-9	50	6.74	ug/kg	40-140	50	40-140	50	50			
Aroclor 1248	12672-29-6	50	7.5	ug/kg	40-140	50	40-140	50	50			
Aroclor 1254	11097-69-1	50	5.47	ug/kg	40-140	50	40-140	50	50			
Aroclor 1260	11096-82-5	50	9.24	ug/kg	40-140	50	40-140	50	50			
Aroclor 1262	37324-23-5	50	6.35	ug/kg	40-140	50	40-140	50	50			
Aroclor 1268	11100-14-4	50	5.18	ug/kg	40-140	50	40-140	50	50			
PCBs, Total	1336-36-3	50	4.44	ug/kg				50	50			
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*		
Decachlorobiphenyl	*2051-24-3*									*30-150*		

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METALS by 6010D (SOIL)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container
Aluminum, Total	7429-90-5	4	1.08	mg/kg	48-151		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Antimony, Total	7440-36-0	2	0.152	mg/kg	1-208		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Arsenic, Total	7440-38-2	0.4	0.0832	mg/kg	79-121		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Barium, Total	7440-39-3	0.4	0.0696	mg/kg	83-117		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Beryllium, Total	7440-41-7	0.2	0.0132	mg/kg	83-117		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Cadmium, Total	7440-43-9	0.4	0.0392	mg/kg	83-117		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Calcium, Total	7440-70-2	4	1.4	mg/kg	81-119		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Chromium, Total	7440-47-3	0.4	0.0384	mg/kg	80-120		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Cobalt, Total	7440-48-4	0.8	0.0664	mg/kg	84-115		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Copper, Total	7440-50-8	0.4	0.1032	mg/kg	81-118		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Iron, Total	7439-89-6	2	0.3612	mg/kg	45-155		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Lead, Total	7439-92-1	2	0.1072	mg/kg	81-117		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Magnesium, Total	7439-95-4	4	0.616	mg/kg	76-124		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Manganese, Total	7439-96-5	0.4	0.0636	mg/kg	81-117		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Nickel, Total	7440-02-0	1	0.0968	mg/kg	83-117		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Potassium, Total	7440-09-7	100	5.76	mg/kg	71-129		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Selenium, Total	7782-49-2	0.8	0.1032	mg/kg	78-122		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Silver, Total	7440-22-4	0.2	0.1132	mg/kg	75-124		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Sodium, Total	7440-23-5	80	1.26	mg/kg	72-127		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Thallium, Total	7440-28-0	0.8	0.126	mg/kg	80-120		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Vanadium, Total	7440-62-2	0.4	0.0812	mg/kg	78-122		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved
Zinc, Total	7440-66-6	2	0.1172	mg/kg	82-118		75-125	20	20		180 days	1 - Metals Only-Glass 60mL/2oz unpreserved

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METALS by 7471B (SOIL)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container
Mercury, Total	7439-97-6	0.08	0.05216	mg/kg	72-128		80-120	20	20		28 days	1 - Metals Only-Glass 60mL/2oz unpreserved

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WETCHEM (SOIL)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Method	Holding Time	Container
Chromium, Hexavalent	18540-29-9	0.8	0.16	mg/kg	80-120	20	75-125	20	20	7196A	30 days	1 - Glass 120ml/4oz unpreserved
Cyanide, Total	57-12-5	1	0.212	mg/kg	80-120	35	75-125	35	35	9010C/9012B	14 days	1 - Glass 250ml/8oz unpreserved

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PFAAs via EPA 1633 (Draft) (SOIL)

Holding Time: 90 days
Container/Sample Preservation: 1 - Plastic 8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Perfluorobutanoic Acid (PFBA)	375-22-4	0.8	0.0504	ng/g	40-150	30	40-150	30	30			
Perfluoropentanoic Acid (PFPeA)	2706-90-3	0.4	0.056	ng/g	40-150	30	40-150	30	30			
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	0.2	0.0432	ng/g	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	757124-72-4	0.8	0.0808	ng/g	40-150	30	40-150	30	30			
Perfluorohexanoic Acid (PFHxA)	307-24-4	0.2	0.0464	ng/g	40-150	30	40-150	30	30			
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	0.2	0.0232	ng/g	40-150	30	40-150	30	30			
Perfluoroheptanoic Acid (PFHpA)	375-85-9	0.2	0.0232	ng/g	40-150	30	40-150	30	30			
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	0.2	0.0592	ng/g	40-150	30	40-150	30	30			
Perfluorooctanoic Acid (PFOA)	335-67-1	0.2	0.052	ng/g	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	27619-97-2	0.8	0.28	ng/g	40-150	30	40-150	30	30			
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	0.2	0.0368	ng/g	40-150	30	40-150	30	30			
Perfluorononanoic Acid (PFNA)	375-95-1	0.2	0.0784	ng/g	40-150	30	40-150	30	30			
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	0.2	0.0792	ng/g	40-150	30	40-150	30	30			
Perfluorodecanoic Acid (PFDA)	335-76-2	0.2	0.0752	ng/g	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	39108-34-4	0.8	0.3872	ng/g	40-150	30	40-150	30	30			
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	0.2	0.0424	ng/g	40-150	30	40-150	30	30			
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSA	2355-31-9	0.2	0.1	ng/g	40-150	30	40-150	30	30			
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	0.2	0.0512	ng/g	40-150	30	40-150	30	30			
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	0.2	0.032	ng/g	40-150	30	40-150	30	30			
Perfluorooctanesulfonamide (FOSA)	754-91-6	0.2	0.0432	ng/g	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	0.2	0.0824	ng/g	40-150	30	40-150	30	30			
Perfluorododecanoic Acid (PFDoA)	307-55-1	0.2	0.0408	ng/g	40-150	30	40-150	30	30			
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	0.2	0.0528	ng/g	40-150	30	40-150	30	30			
Perfluorotetradecanoic Acid (PFTA)	376-06-7	0.2	0.1064	ng/g	40-150	30	40-150	30	30			
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Pr	13252-13-6	0.8	0.0984	ng/g	40-150	30	40-150	30	30			
4,8-Dioxa-3h-Perfluorononanoic Acid (ADONA)	919005-14-4	0.8	0.1464	ng/g	40-150	30	40-150	30	30			
Perfluorododecane Sulfonic Acid (PFDoDS)	79780-39-5	0.2	0.0384	ng/g	40-150	30	40-150	30	30			
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid (9Cl-PF	756426-58-1	0.8	0.196	ng/g	40-150	30	40-150	30	30			
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl	763051-92-9	0.8	0.1672	ng/g	40-150	30	40-150	30	30			
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	31506-32-8	0.2	0.1	ng/g	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	4151-50-2	0.2	0.112	ng/g	40-150	30	40-150	30	30			
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	24448-09-7	2	0.2504	ng/g	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	1691-99-2	2	0.5104	ng/g	40-150	30	40-150	30	30			
Perfluoro-3-Methoxypropanoic Acid (PFMPA)	377-73-1	0.4	0.0408	ng/g	40-150	30	40-150	30	30			
Perfluoro-4-Methoxybutanoic Acid (PFMBA)	863090-89-5	0.4	0.0312	ng/g	40-150	30	40-150	30	30			
Perfluoro(2-Ethoxyethane)Sulfonic Acid (PFEESA)	113507-82-7	0.4	0.0832	ng/g	40-150	30	40-150	30	30			
Nonafluoro-3,6-Dioxaheptanoic Acid (NFDHA)	151772-58-6	0.4	0.0952	ng/g	40-150	30	40-150	30	30			
3-Perfluoropropyl Propanoic Acid (3:3FTCA)	356-02-5	1	0.144	ng/g	40-150	30	40-150	30	30			
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3FTCA)	914637-49-3	5	0.5048	ng/g	40-150	30	40-150	30	30			
3-Perfluoroheptyl Propanoic Acid (7:3FTCA)	812-70-4	5	1.76	ng/g	40-150	30	40-150	30	30			
Perfluoro[13C4]Butanoic Acid (MPFBA)	*NONE*									*20-150*		
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	*NONE*									*20-150*		

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PFAAs via EPA 1633 (Draft) (SOIL)

Holding Time: 90 days
Container/Sample Preservation: 1 - Plastic 8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-	*NONE*									*20-150*		
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	*NONE*									*20-150*		
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	*NONE*									*20-150*		
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	*NONE*									*20-150*		
Perfluoro[13C8]Octanoic Acid (M8PFOA)	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-	*NONE*									*20-150*		
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	*NONE*									*20-150*		
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	*NONE*									*20-150*		
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-	*NONE*									*20-150*		
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid	*NONE*									*20-150*		
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	*NONE*									*20-150*		
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	*NONE*									*20-150*		
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (	*NONE*									*20-150*		
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	*NONE*									*20-150*		
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	*NONE*									*20-150*		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-1	*NONE*									*20-150*		
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	*NONE*									*20-150*		
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	*NONE*									*20-150*		
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-o	*1265205-95-5*									*20-150*		
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (	*NONE*									*20-150*		

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ATTACHMENT B

GROUNDWATER SAMPLES
LABORATORY REPORTING LIMITS AND METHOD DETECTION LIMITS

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Langan Engineering & Environmental

TCL Volatiles - EPA 8260D (WATER)

Holding Time: 14 days
Container/Sample Preservation: 3 - Vial HCl preserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Methylene chloride	75-09-2	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,1-Dichloroethane	75-34-3	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Chloroform	67-66-3	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Carbon tetrachloride	56-23-5	0.5	0.134	ug/l	63-132	20	63-132	20	20			
1,2-Dichloropropane	78-87-5	1	0.137	ug/l	70-130	20	70-130	20	20			
Dibromochloromethane	124-48-1	0.5	0.149	ug/l	63-130	20	63-130	20	20			
1,1,2-Trichloroethane	79-00-5	1.5	0.5	ug/l	70-130	20	70-130	20	20			
Tetrachloroethene	127-18-4	0.5	0.181	ug/l	70-130	20	70-130	20	20			
Chlorobenzene	108-90-7	2.5	0.7	ug/l	75-130	20	75-130	20	20			
Trichlorofluoromethane	75-69-4	2.5	0.7	ug/l	62-150	20	62-150	20	20			
1,2-Dichloroethane	107-06-2	0.5	0.132	ug/l	70-130	20	70-130	20	20			
1,1,1-Trichloroethane	71-55-6	2.5	0.7	ug/l	67-130	20	67-130	20	20			
Bromodichloromethane	75-27-4	0.5	0.192	ug/l	67-130	20	67-130	20	20			
trans-1,3-Dichloropropene	10061-02-6	0.5	0.164	ug/l	70-130	20	70-130	20	20			
cis-1,3-Dichloropropene	10061-01-5	0.5	0.144	ug/l	70-130	20	70-130	20	20			
1,3-Dichloropropene, Total	542-75-6	0.5	0.144	ug/l				20	20			
1,1-Dichloropropene	563-58-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Bromoform	75-25-2	2	0.65	ug/l	54-136	20	54-136	20	20			
1,1,2,2-Tetrachloroethane	79-34-5	0.5	0.167	ug/l	67-130	20	67-130	20	20			
Benzene	71-43-2	0.5	0.159	ug/l	70-130	20	70-130	20	20			
Toluene	108-88-3	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Ethylbenzene	100-41-4	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Chloromethane	74-87-3	2.5	0.7	ug/l	64-130	20	64-130	20	20			
Bromomethane	74-83-9	2.5	0.7	ug/l	39-139	20	39-139	20	20			
Vinyl chloride	75-01-4	1	0.0714	ug/l	55-140	20	55-140	20	20			
Chloroethane	75-00-3	2.5	0.7	ug/l	55-138	20	55-138	20	20			
1,1-Dichloroethene	75-35-4	0.5	0.169	ug/l	61-145	20	61-145	20	20			
trans-1,2-Dichloroethene	156-60-5	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Trichloroethene	79-01-6	0.5	0.175	ug/l	70-130	20	70-130	20	20			
1,2-Dichlorobenzene	95-50-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,3-Dichlorobenzene	541-73-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,4-Dichlorobenzene	106-46-7	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Methyl tert butyl ether	1634-04-4	2.5	0.7	ug/l	63-130	20	63-130	20	20			
p/m-Xylene	179601-23-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
o-Xylene	95-47-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Xylene (Total)	1330-20-7	2.5	0.7	ug/l				20	20			
cis-1,2-Dichloroethene	156-59-2	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,2-Dichloroethene (total)	540-59-0	2.5	0.7	ug/l				20	20			
Dibromomethane	74-95-3	5	1	ug/l	70-130	20	70-130	20	20			
1,2,3-Trichloropropane	96-18-4	2.5	0.7	ug/l	64-130	20	64-130	20	20			
Acrylonitrile	107-13-1	5	1.5	ug/l	70-130	20	70-130	20	20			
Styrene	100-42-5	2.5	0.7	ug/l	70-130	20	70-130	20	20			

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TCL Volatiles - EPA 8260D (WATER)

Holding Time: 14 days
Container/Sample Preservation: 3 - Vial HCl preserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Dichlorodifluoromethane	75-71-8	5	1	ug/l	36-147	20	36-147	20	20			
Acetone	67-64-1	5	1.46	ug/l	58-148	20	58-148	20	20			
Carbon disulfide	75-15-0	5	1	ug/l	51-130	20	51-130	20	20			
2-Butanone	78-93-3	5	1.94	ug/l	63-138	20	63-138	20	20			
Vinyl acetate	108-05-4	5	1	ug/l	70-130	20	70-130	20	20			
4-Methyl-2-pentanone	108-10-1	5	1	ug/l	59-130	20	59-130	20	20			
2-Hexanone	591-78-6	5	1	ug/l	57-130	20	57-130	20	20			
Bromochloromethane	74-97-5	2.5	0.7	ug/l	70-130	20	70-130	20	20			
2,2-Dichloropropane	594-20-7	2.5	0.7	ug/l	63-133	20	63-133	20	20			
1,2-Dibromoethane	106-93-4	2	0.65	ug/l	70-130	20	70-130	20	20			
1,3-Dichloropropane	142-28-9	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,1,1,2-Tetrachloroethane	630-20-6	2.5	0.7	ug/l	64-130	20	64-130	20	20			
Bromobenzene	108-86-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
n-Butylbenzene	104-51-8	2.5	0.7	ug/l	53-136	20	53-136	20	20			
sec-Butylbenzene	135-98-8	2.5	0.7	ug/l	70-130	20	70-130	20	20			
tert-Butylbenzene	98-06-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
o-Chlorotoluene	95-49-8	2.5	0.7	ug/l	70-130	20	70-130	20	20			
p-Chlorotoluene	106-43-4	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,2-Dibromo-3-chloropropane	96-12-8	2.5	0.7	ug/l	41-144	20	41-144	20	20			
Hexachlorobutadiene	87-68-3	2.5	0.7	ug/l	63-130	20	63-130	20	20			
Isopropylbenzene	98-82-8	2.5	0.7	ug/l	70-130	20	70-130	20	20			
p-Isopropyltoluene	99-87-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Naphthalene	91-20-3	2.5	0.7	ug/l	70-130	20	70-130	20	20			
n-Propylbenzene	103-65-1	2.5	0.7	ug/l	69-130	20	69-130	20	20			
1,2,3-Trichlorobenzene	87-61-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,2,4-Trichlorobenzene	120-82-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,3,5-Trimethylbenzene	108-67-8	2.5	0.7	ug/l	64-130	20	64-130	20	20			
1,2,4-Trimethylbenzene	95-63-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,4-Dioxane	123-91-1	250	60.8	ug/l	56-162	20	56-162	20	20			
1,4-Diethylbenzene	105-05-5	2	0.7	ug/l	70-130	20	70-130	20	20			
4-Ethyltoluene	622-96-8	2	0.7	ug/l	70-130	20	70-130	20	20			
1,2,4,5-Tetramethylbenzene	95-93-2	2	0.542	ug/l	70-130	20	70-130	20	20			
Ethyl ether	60-29-7	2.5	0.7	ug/l	59-134	20	59-134	20	20			
trans-1,4-Dichloro-2-butene	110-57-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,2-Dichloroethane-d4	*17060-07-0*									*70-130*		
Toluene-d8	*2037-26-5*									*70-130*		
4-Bromofluorobenzene	*460-00-4*									*70-130*		
Dibromofluoromethane	*1868-53-7*									*70-130*		

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NYTCL Semivolatiles - EPA 8270E (LVI) (WATER)

Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 250ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Acenaphthene	83-32-9	2.002	0.44408	ug/l	37-111	30	37-111	30	30			
1,2,4-Trichlorobenzene	120-82-1	5.0232	0.49868	ug/l	39-98	30	39-98	30	30			
Hexachlorobenzene	118-74-1	2.002	0.46592	ug/l	40-140	30	40-140	30	30			
Bis(2-chloroethyl)ether	111-44-4	2.002	0.50596	ug/l	40-140	30	40-140	30	30			
2-Chloronaphthalene	91-58-7	2.002	0.4368	ug/l	40-140	30	40-140	30	30			
1,2-Dichlorobenzene	95-50-1	2.002	0.455	ug/l	40-140	30	40-140	30	30			
1,3-Dichlorobenzene	541-73-1	2.002	0.40404	ug/l	40-140	30	40-140	30	30			
1,4-Dichlorobenzene	106-46-7	2.002	0.43316	ug/l	36-97	30	36-97	30	30			
3,3'-Dichlorobenzidine	91-94-1	5.0232	1.62344	ug/l	40-140	30	40-140	30	30			
2,4-Dinitrotoluene	121-14-2	5.0232	1.1648	ug/l	48-143	30	48-143	30	30			
2,6-Dinitrotoluene	606-20-2	5.0232	0.93184	ug/l	40-140	30	40-140	30	30			
Fluoranthene	206-44-0	2.002	0.257348	ug/l	40-140	30	40-140	30	30			
4-Chlorophenyl phenyl ether	7005-72-3	2.002	0.48776	ug/l	40-140	30	40-140	30	30			
4-Bromophenyl phenyl ether	101-55-3	2.002	0.37856	ug/l	40-140	30	40-140	30	30			
Bis(2-chloroisopropyl)ether	108-60-1	2.002	0.5278	ug/l	40-140	30	40-140	30	30			
Bis(2-chloroethoxy)methane	111-91-1	5.0232	0.50232	ug/l	40-140	30	40-140	30	30			
Hexachlorobutadiene	87-68-3	2.002	0.65884	ug/l	40-140	30	40-140	30	30			
Hexachlorocyclopentadiene	77-47-4	20.02	0.68796	ug/l	40-140	30	40-140	30	30			
Hexachloroethane	67-72-1	2.002	0.58604	ug/l	40-140	30	40-140	30	30			
Isophorone	78-59-1	5.0232	1.20484	ug/l	40-140	30	40-140	30	30			
Naphthalene	91-20-3	2.002	0.46592	ug/l	40-140	30	40-140	30	30			
Nitrobenzene	98-95-3	2.002	0.77168	ug/l	40-140	30	40-140	30	30			
NitrosoDiPhenylAmine(NDPA)/DPA	86-30-6	2.002	0.4186	ug/l	40-140	30	40-140	30	30			
n-Nitrosodi-n-propylamine	621-64-7	5.0232	0.64428	ug/l	29-132	30	29-132	30	30			
Bis(2-Ethylhexyl)phthalate	117-81-7	3.003	1.53608	ug/l	40-140	30	40-140	30	30			
Butyl benzyl phthalate	85-68-7	5.0232	1.17208	ug/l	40-140	30	40-140	30	30			
Di-n-butylphthalate	84-74-2	5.0232	0.38948	ug/l	40-140	30	40-140	30	30			
Di-n-octylphthalate	117-84-0	5.0232	1.274	ug/l	40-140	30	40-140	30	30			
Diethyl phthalate	84-66-2	5.0232	0.3822	ug/l	40-140	30	40-140	30	30			
Dimethyl phthalate	131-11-3	5.0232	1.82	ug/l	40-140	30	40-140	30	30			
Benzo(a)anthracene	56-55-3	2.002	0.32578	ug/l	40-140	30	40-140	30	30			
Benzo(a)pyrene	50-32-8	2.002	0.40768	ug/l	40-140	30	40-140	30	30			
Benzo(b)fluoranthene	205-99-2	2.002	0.355264	ug/l	40-140	30	40-140	30	30			
Benzo(k)fluoranthene	207-08-9	2.002	0.37492	ug/l	40-140	30	40-140	30	30			
Chrysene	218-01-9	2.002	0.341068	ug/l	40-140	30	40-140	30	30			
Acenaphthylene	208-96-8	2.002	0.46592	ug/l	45-123	30	45-123	30	30			
Anthracene	120-12-7	2.002	0.32942	ug/l	40-140	30	40-140	30	30			
Benzo(ghi)perylene	191-24-2	2.002	0.296296	ug/l	40-140	30	40-140	30	30			
Fluorene	86-73-7	2.002	0.41496	ug/l	40-140	30	40-140	30	30			
Phenanthrene	85-01-8	2.002	0.33124	ug/l	40-140	30	40-140	30	30			
Dibenzo(a,h)anthracene	53-70-3	2.002	0.323232	ug/l	40-140	30	40-140	30	30			
Indeno(1,2,3-cd)Pyrene	193-39-5	2.002	0.39676	ug/l	40-140	30	40-140	30	30			

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Langan Engineering & Environmental

NYTCL Semivolatiles - EPA 8270E (LVI) (WATER)

Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 250ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Pyrene	129-00-0	2.002	0.279552	ug/l	26-127	30	26-127	30	30			
Biphenyl	92-52-4	2.002	0.45864	ug/l	40-140	30	40-140	30	30			
4-Chloroaniline	106-47-8	5.0232	1.07016	ug/l	40-140	30	40-140	30	30			
2-Nitroaniline	88-74-4	5.0232	0.49868	ug/l	52-143	30	52-143	30	30			
3-Nitroaniline	99-09-2	5.0232	0.81536	ug/l	25-145	30	25-145	30	30			
4-Nitroaniline	100-01-6	5.0232	0.8008	ug/l	51-143	30	51-143	30	30			
Dibenzofuran	132-64-9	2.002	0.49868	ug/l	40-140	30	40-140	30	30			
2-Methylnaphthalene	91-57-6	2.002	0.455	ug/l	40-140	30	40-140	30	30			
Acetophenone	98-86-2	5.0232	0.5278	ug/l	39-129	30	39-129	30	30			
2,4,6-Trichlorophenol	88-06-2	5.0232	0.61152	ug/l	30-130	30	30-130	30	30			
P-Chloro-M-Cresol	59-50-7	2.002	0.35126	ug/l	23-97	30	23-97	30	30			
2-Chlorophenol	95-57-8	2.002	0.48048	ug/l	27-123	30	27-123	30	30			
2,4-Dichlorophenol	120-83-2	5.0232	0.41132	ug/l	30-130	30	30-130	30	30			
2,4-Dimethylphenol	105-67-9	5.0232	1.77996	ug/l	30-130	30	30-130	30	30			
2-Nitrophenol	88-75-5	10.01	0.84812	ug/l	30-130	30	30-130	30	30			
4-Nitrophenol	100-02-7	10.01	0.6734	ug/l	10-80	30	10-80	30	30			
2,4-Dinitrophenol	51-28-5	20.02	6.6612	ug/l	20-130	30	20-130	30	30			
4,6-Dinitro-o-cresol	534-52-1	10.01	1.81636	ug/l	20-164	30	20-164	30	30			
Pentachlorophenol	87-86-5	10.01	1.79452	ug/l	9-103	30	9-103	30	30			
Phenol	108-95-2	5.0232	0.56784	ug/l	12-110	30	12-110	30	30			
2-Methylphenol	95-48-7	5.0232	0.4914	ug/l	30-130	30	30-130	30	30			
3-Methylphenol/4-Methylphenol	108-39-4/106-44-5	5.0232	0.48048	ug/l	30-130	30	30-130	30	30			
2,4,5-Trichlorophenol	95-95-4	5.0232	0.77532	ug/l	30-130	30	30-130	30	30			
Benzoic Acid	65-85-0	50.232	2.66084	ug/l	10-164	30	10-164	30	30			
Benzyl Alcohol	100-51-6	2.002	0.58968	ug/l	26-116	30	26-116	30	30			
Carbazole	86-74-8	2.002	0.4914	ug/l	55-144	30	55-144	30	30			
2-Fluorophenol	*367-12-4*									*21-120*		
Phenol-d6	*13127-88-3*									*10-120*		
Nitrobenzene-d5	*4165-60-0*									*23-120*		
2-Fluorobiphenyl	*321-60-8*									*15-120*		
2,4,6-Tribromophenol	*118-79-6*									*10-120*		
4-Terphenyl-d14	*1718-51-0*									*41-149*		

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Langan Engineering & Environmental

NYTCL Semivolatiles -EPA 8270E-SIM (LVI) (WATER)

Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 250ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Acenaphthene	83-32-9	0.1001	0.01442168	ug/l	40-140	40	40-140	40	40			
2-Chloronaphthalene	91-58-7	0.2002	0.01804712	ug/l	40-140	40	40-140	40	40			
Fluoranthene	206-44-0	0.1001	0.02054052	ug/l	40-140	40	40-140	40	40			
Hexachlorobutadiene	87-68-3	0.5005	0.04674852	ug/l	40-140	40	40-140	40	40			
Naphthalene	91-20-3	0.1001	0.04882696	ug/l	40-140	40	40-140	40	40			
Benzo(a)anthracene	56-55-3	0.1001	0.0198198	ug/l	40-140	40	40-140	40	40			
Benzo(a)pyrene	50-32-8	0.1001	0.01493856	ug/l	40-140	40	40-140	40	40			
Benzo(b)fluoranthene	205-99-2	0.1001	0.01156792	ug/l	40-140	40	40-140	40	40			
Benzo(k)fluoranthene	207-08-9	0.1001	0.00889616	ug/l	40-140	40	40-140	40	40			
Chrysene	218-01-9	0.1001	0.01198288	ug/l	40-140	40	40-140	40	40			
Acenaphthylene	208-96-8	0.1001	0.01222676	ug/l	40-140	40	40-140	40	40			
Anthracene	120-12-7	0.1001	0.01450176	ug/l	40-140	40	40-140	40	40			
Benzo(ghi)perylene	191-24-2	0.1001	0.01365	ug/l	40-140	40	40-140	40	40			
Fluorene	86-73-7	0.1001	0.01456364	ug/l	40-140	40	40-140	40	40			
Phenanthrene	85-01-8	0.1001	0.02333604	ug/l	40-140	40	40-140	40	40			
Dibenzo(a,h)anthracene	53-70-3	0.1001	0.0127218	ug/l	40-140	40	40-140	40	40			
Indeno(1,2,3-cd)Pyrene	193-39-5	0.1001	0.01217216	ug/l	40-140	40	40-140	40	40			
Pyrene	129-00-0	0.1001	0.01902264	ug/l	40-140	40	40-140	40	40			
2-Methylnaphthalene	91-57-6	0.1001	0.02192372	ug/l	40-140	40	40-140	40	40			
Pentachlorophenol	87-86-5	0.8008	0.0143416	ug/l	40-140	40	40-140	40	40			
Hexachlorobenzene	118-74-1	0.8008	0.00938028	ug/l	40-140	40	40-140	40	40			
Hexachloroethane	67-72-1	0.8008	0.06320132	ug/l	40-140	40	40-140	40	40			
2-Fluorophenol	*367-12-4*									*21-120*		
Phenol-d6	*13127-88-3*									*10-120*		
Nitrobenzene-d5	*4165-60-0*									*23-120*		
2-Fluorobiphenyl	*321-60-8*									*15-120*		
2,4,6-Tribromophenol	*118-79-6*									*10-120*		
4-Terphenyl-d14	*1718-51-0*									*41-149*		

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TCL Pesticides - EPA 8081B (WATER)

Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 120ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Delta-BHC	319-86-8	0.02	0.00467	ug/l	30-150	20	30-150	30	30			
Lindane	58-89-9	0.02	0.00434	ug/l	30-150	20	30-150	30	30			
Alpha-BHC	319-84-6	0.02	0.00439	ug/l	30-150	20	30-150	30	30			
Beta-BHC	319-85-7	0.02	0.0056	ug/l	30-150	20	30-150	30	30			
Heptachlor	76-44-8	0.02	0.0031	ug/l	30-150	20	30-150	30	30			
Aldrin	309-00-2	0.02	0.00216	ug/l	30-150	20	30-150	30	30			
Heptachlor epoxide	1024-57-3	0.02	0.00415	ug/l	30-150	20	30-150	30	30			
Endrin	72-20-8	0.04	0.00429	ug/l	30-150	20	30-150	30	30			
Endrin aldehyde	7421-93-4	0.04	0.0081	ug/l	30-150	20	30-150	30	30			
Endrin ketone	53494-70-5	0.04	0.00477	ug/l	30-150	20	30-150	30	30			
Dieldrin	60-57-1	0.04	0.00429	ug/l	30-150	20	30-150	30	30			
4,4'-DDE	72-55-9	0.04	0.00381	ug/l	30-150	20	30-150	30	30			
4,4'-DDD	72-54-8	0.04	0.00464	ug/l	30-150	20	30-150	30	30			
4,4'-DDT	50-29-3	0.04	0.00432	ug/l	30-150	20	30-150	30	30			
Endosulfan I	959-98-8	0.02	0.00345	ug/l	30-150	20	30-150	30	30			
Endosulfan II	33213-65-9	0.04	0.00519	ug/l	30-150	20	30-150	30	30			
Endosulfan sulfate	1031-07-8	0.04	0.00481	ug/l	30-150	20	30-150	30	30			
Methoxychlor	72-43-5	0.2	0.00684	ug/l	30-150	20	30-150	30	30			
Toxaphene	8001-35-2	0.2	0.0627	ug/l	30-150	20	30-150	30	30			
cis-Chlordane	5103-71-9	0.02	0.00666	ug/l	30-150	20	30-150	30	30			
trans-Chlordane	5103-74-2	0.02	0.00627	ug/l	30-150	20	30-150	30	30			
Chlordane	57-74-9	0.2	0.0463	ug/l	30-150	20	30-150	30	30			
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*		
Decachlorobiphenyl	*2051-24-3*									*30-150*		

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Langan Engineering & Environmental

Herbicides -EPA 8151A (WATER)

Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 1000ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
2,4-D	94-75-7	10	0.498	ug/l	30-150	25	30-150	25	25			
2,4,5-T	93-76-5	2	0.531	ug/l	30-150	25	30-150	25	25			
2,4,5-TP (Silvex)	93-72-1	2	0.539	ug/l	30-150	25	30-150	25	25			
DCAA	*19719-28-9*									*30-150*		

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TCL PCBs - EPA 8082A (LVI) (WATER)

Holding Time: 365 days
Container/Sample Preservation: 2 - Amber 120ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Aroclor 1016	12674-11-2	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1221	11104-28-2	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1232	11141-16-5	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1242	53469-21-9	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1248	12672-29-6	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1254	11097-69-1	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1260	11096-82-5	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1262	37324-23-5	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1268	11100-14-4	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
PCBs, Total	1336-36-3	0.0000714	0.000061047	mg/l				50	50			
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*		
Decachlorobiphenyl	*2051-24-3*									*30-150*		

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METALS by 6020B (WATER)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container
Aluminum, Total	7429-90-5	0.01	0.00327	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Antimony, Total	7440-36-0	0.004	0.000429	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Arsenic, Total	7440-38-2	0.0005	0.000165	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Barium, Total	7440-39-3	0.0005	0.000173	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Beryllium, Total	7440-41-7	0.0005	0.000107	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Cadmium, Total	7440-43-9	0.0002	0.0000599	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Calcium, Total	7440-70-2	0.1	0.0394	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Chromium, Total	7440-47-3	0.001	0.000178	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Cobalt, Total	7440-48-4	0.0005	0.000163	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Copper, Total	7440-50-8	0.001	0.000384	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Iron, Total	7439-89-6	0.05	0.0191	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Lead, Total	7439-92-1	0.001	0.000343	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Magnesium, Total	7439-95-4	0.07	0.0242	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Manganese, Total	7439-96-5	0.001	0.00044	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Nickel, Total	7440-02-0	0.002	0.000556	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Potassium, Total	7440-09-7	0.1	0.0309	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Selenium, Total	7782-49-2	0.005	0.00173	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Silver, Total	7440-22-4	0.0004	0.000163	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Sodium, Total	7440-23-5	0.1	0.0293	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Thallium, Total	7440-28-0	0.001	0.000143	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Vanadium, Total	7440-62-2	0.005	0.00157	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Zinc, Total	7440-66-6	0.01	0.00341	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved

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METALS by 7470A (WATER)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container
Mercury, Total	7439-97-6	0.0002	0.0000915	mg/l	80-120		75-125	20	20		28 days	1 - Plastic 500ml HNO3 preserved

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WETCHEM (WATER)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Method	Holding Time	Container
Chromium, Hexavalent	18540-29-9	0.01	0.003	mg/l	85-115	20	85-115	20	20	7196A	24 hours	1 - Plastic 500ml unpreserved
Cyanide, Total	57-12-5	0.005	0.0018	mg/l	85-115	20	80-120	20	20	9010C/9012B	14 days	1 - Plastic 250ml NaOH preserved

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1,4 Dioxane via EPA 8270E-SIM (WATER)

Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 250ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
1,4-Dioxane	123-91-1	150	33.9	ng/l	40-140	30	40-140	30	30			
1,4-Dioxane-d8	*17647-74-4*									*15-110*		
1,4-Dioxane-d8 (IS)	17647-74-4			ng/l								

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PFAAs via LCMSMS-Isotope Dilution (WATER)

Holding Time: 28 days
Container/Sample Preservation: 3 - Plastic 500ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Perfluorobutanoic Acid (PFBA)	375-22-4	6.4	1.024	ng/l	40-150	30	40-150	30	30			
Perfluoropentanoic Acid (PFPeA)	2706-90-3	3.2	0.856	ng/l	40-150	30	40-150	30	30			
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	1.6	0.536	ng/l	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	757124-72-4	6.4	1.672	ng/l	40-150	30	40-150	30	30			
Perfluorohexanoic Acid (PFHxA)	307-24-4	1.6	0.472	ng/l	40-150	30	40-150	30	30			
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	1.6	0.28	ng/l	40-150	30	40-150	30	30			
Perfluoroheptanoic Acid (PFHpA)	375-85-9	1.6	0.32	ng/l	40-150	30	40-150	30	30			
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	1.6	0.384	ng/l	40-150	30	40-150	30	30			
Perfluorooctanoic Acid (PFOA)	335-67-1	1.6	0.696	ng/l	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	27619-97-2	6.4	2.16	ng/l	40-150	30	40-150	30	30			
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	1.6	0.432	ng/l	40-150	30	40-150	30	30			
Perfluorononanoic Acid (PFNA)	375-95-1	1.6	0.504	ng/l	40-150	30	40-150	30	30			
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	1.6	0.728	ng/l	40-150	30	40-150	30	30			
Perfluorodecanoic Acid (PFDA)	335-76-2	1.6	0.648	ng/l	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	39108-34-4	6.4	2.488	ng/l	40-150	30	40-150	30	30			
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	1.6	0.496	ng/l	40-150	30	40-150	30	30			
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSA	2355-31-9	1.6	0.872	ng/l	40-150	30	40-150	30	30			
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1.6	0.696	ng/l	40-150	30	40-150	30	30			
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	1.6	0.368	ng/l	40-150	30	40-150	30	30			
Perfluorooctanesulfonamide (FOSA)	754-91-6	1.6	0.432	ng/l	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	1.6	0.864	ng/l	40-150	30	40-150	30	30			
Perfluorododecanoic Acid (PFDoA)	307-55-1	1.6	0.736	ng/l	40-150	30	40-150	30	30			
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1.6	0.6	ng/l	40-150	30	40-150	30	30			
Perfluorotetradecanoic Acid (PFTA)	376-06-7	1.6	0.424	ng/l	40-150	30	40-150	30	30			
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Pr	13252-13-6	6.4	0.896	ng/l	40-150	30	40-150	30	30			
4,8-Dioxa-3h-Perfluorononanoic Acid (ADONA)	919005-14-4	6.4	1.008	ng/l	40-150	30	40-150	30	30			
Perfluorododecane Sulfonic Acid (PFDoDS)	79780-39-5	1.6	0.608	ng/l	40-150	30	40-150	30	30			
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid (9Cl-PF	756426-58-1	6.4	1.32	ng/l	40-150	30	40-150	30	30			
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl	763051-92-9	6.4	1.32	ng/l	40-150	30	40-150	30	30			
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	31506-32-8	1.6	0.696	ng/l	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	4151-50-2	1.6	0.736	ng/l	40-150	30	40-150	30	30			
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	24448-09-7	16	3.76	ng/l	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	1691-99-2	16	1.96	ng/l	40-150	30	40-150	30	30			
Perfluoro-3-Methoxypropanoic Acid (PFMPA)	377-73-1	3.2	0.456	ng/l	40-150	30	40-150	30	30			
Perfluoro-4-Methoxybutanoic Acid (PFMBA)	863090-89-5	3.2	0.424	ng/l	40-150	30	40-150	30	30			
Perfluoro(2-Ethoxyethane)Sulfonic Acid (PFEESA)	113507-82-7	3.2	0.352	ng/l	40-150	30	40-150	30	30			
Nonafluoro-3,6-Dioxaheptanoic Acid (NFDHA)	151772-58-6	3.2	1.888	ng/l	40-150	30	40-150	30	30			
3-Perfluoropropyl Propanoic Acid (3:3FTCA)	356-02-5	8	2.64	ng/l	40-150	30	40-150	30	30			
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3FTCA)	914637-49-3	40	9.36	ng/l	40-150	30	40-150	30	30			
3-Perfluoroheptyl Propanoic Acid (7:3FTCA)	812-70-4	40	6.312	ng/l	40-150	30	40-150	30	30			
Perfluoro[13C4]Butanoic Acid (MPFBA)	*NONE*									*20-150*		
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	*NONE*									*20-150*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

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Langan Engineering & Environmental

PFAAs via LCMSMS-Isotope Dilution (WATER)

Holding Time: 28 days
Container/Sample Preservation: 3 - Plastic 500ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-	*NONE*									*20-150*		
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	*NONE*									*20-150*		
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	*NONE*									*20-150*		
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	*NONE*									*20-150*		
Perfluoro[13C8]Octanoic Acid (M8PFOA)	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-	*NONE*									*20-150*		
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	*NONE*									*20-150*		
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	*NONE*									*20-150*		
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-	*NONE*									*20-150*		
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid	*NONE*									*20-150*		
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	*NONE*									*20-150*		
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	*NONE*									*20-150*		
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (	*NONE*									*20-150*		
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	*NONE*									*20-150*		
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	*NONE*									*20-150*		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-1	*NONE*									*20-150*		
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	*NONE*									*20-150*		
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	*NONE*									*20-150*		
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-o	*1265205-95-5*									*20-150*		
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (	*NONE*									*20-150*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor ***(Soil/Solids only)***
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

ATTACHMENT B

AIR SAMPLES
LABORATORY REPORTING LIMITS AND METHOD DETECTION LIMITS

Method	Analyte	Units	Reporting Limit		Method	Analyte	Units	Reporting Limit
TO15	1,1,1-Trichloroethane	1.09	ug/m3		TO15	1,1,1-Trichloroethane	0.2	ppbV
TO15	1,1,2,2-Tetrachloroethane	1.37	ug/m3		TO15	1,1,2,2-Tetrachloroethane	0.2	ppbV
TO15	1,1,2-Trichloroethane	1.09	ug/m3		TO15	1,1,2-Trichloroethane	0.2	ppbV
TO15	1,1-Dichloroethane	0.809	ug/m3		TO15	1,1-Dichloroethane	0.2	ppbV
TO15	1,1-Dichloroethene	0.793	ug/m3		TO15	1,1-Dichloroethene	0.2	ppbV
TO15	1,2,4-Trichlorobenzene	1.48	ug/m3		TO15	1,2,4-Trichlorobenzene	0.2	ppbV
TO15	1,2,4-Trimethylbenzene	0.983	ug/m3		TO15	1,2,4-Trimethylbenzene	0.2	ppbV
TO15	1,2-Dibromoethane	1.54	ug/m3		TO15	1,2-Dibromoethane	0.2	ppbV
TO15	1,2-Dichlorobenzene	1.2	ug/m3		TO15	1,2-Dichlorobenzene	0.2	ppbV
TO15	1,2-Dichloroethane	0.809	ug/m3		TO15	1,2-Dichloroethane	0.2	ppbV
TO15	1,2-Dichloropropane	0.924	ug/m3		TO15	1,2-Dichloropropane	0.2	ppbV
TO15	1,3,5-Trimethylbenzene	0.983	ug/m3		TO15	1,3,5-Trimethylbenzene	0.2	ppbV
TO15	1,3-Butadiene	0.442	ug/m3		TO15	1,3-Butadiene	0.2	ppbV
TO15	1,3-Dichlorobenzene	1.2	ug/m3		TO15	1,3-Dichlorobenzene	0.2	ppbV
TO15	1,4-Dichlorobenzene	1.2	ug/m3		TO15	1,4-Dichlorobenzene	0.2	ppbV
TO15	1,4-Dioxane	0.721	ug/m3		TO15	1,4-Dioxane	0.2	ppbV
TO15	2,2,4-Trimethylpentane	0.934	ug/m3		TO15	2,2,4-Trimethylpentane	0.2	ppbV
TO15	2-Butanone	1.47	ug/m3		TO15	2-Butanone	0.5	ppbV
TO15	2-Hexanone	0.82	ug/m3		TO15	2-Hexanone	0.2	ppbV
TO15	3-Chloropropene	0.626	ug/m3		TO15	3-Chloropropene	0.2	ppbV
TO15	4-Ethyltoluene	0.983	ug/m3		TO15	4-Ethyltoluene	0.2	ppbV
TO15	4-Methyl-2-pentanone	2.05	ug/m3		TO15	4-Methyl-2-pentanone	0.5	ppbV
TO15	Acetone	2.38	ug/m3		TO15	Acetone	1	ppbV
TO15	Benzene	0.639	ug/m3		TO15	Benzene	0.2	ppbV
TO15	Benzyl chloride	1.04	ug/m3		TO15	Benzyl chloride	0.2	ppbV
TO15	Bromodichloromethane	1.34	ug/m3		TO15	Bromodichloromethane	0.2	ppbV
TO15	Bromoform	2.07	ug/m3		TO15	Bromoform	0.2	ppbV
TO15	Bromomethane	0.777	ug/m3		TO15	Bromomethane	0.2	ppbV
TO15	Carbon disulfide	0.623	ug/m3		TO15	Carbon disulfide	0.2	ppbV
TO15	Carbon tetrachloride	1.26	ug/m3		TO15	Carbon tetrachloride	0.2	ppbV
TO15	Chlorobenzene	0.921	ug/m3		TO15	Chlorobenzene	0.2	ppbV
TO15	Chloroethane	0.528	ug/m3		TO15	Chloroethane	0.2	ppbV
TO15	Chloroform	0.977	ug/m3		TO15	Chloroform	0.2	ppbV
TO15	Chloromethane	0.413	ug/m3		TO15	Chloromethane	0.2	ppbV
TO15	cis-1,2-Dichloroethene	0.793	ug/m3		TO15	cis-1,2-Dichloroethene	0.2	ppbV

ATTACHMENT B

AIR SAMPLES
LABORATORY REPORTING LIMITS AND METHOD DETECTION LIMITS

Method	Analyte	Units	Reporting Limit		Method	Analyte	Units	Reporting Limit
TO15	cis-1,3-Dichloropropene	0.908	ug/m3		TO15	cis-1,3-Dichloropropene	0.2	ppbV
TO15	Cyclohexane	0.688	ug/m3		TO15	Cyclohexane	0.2	ppbV
TO15	Dibromochloromethane	1.7	ug/m3		TO15	Dibromochloromethane	0.2	ppbV
TO15	Dichlorodifluoromethane	0.989	ug/m3		TO15	Dichlorodifluoromethane	0.2	ppbV
TO15	Ethanol	9.42	ug/m3		TO15	Ethanol	5	ppbV
TO15	Ethyl Acetate	1.8	ug/m3		TO15	Ethyl Acetate	0.5	ppbV
TO15	Ethylbenzene	0.869	ug/m3		TO15	Ethylbenzene	0.2	ppbV
TO15	Freon-113	1.53	ug/m3		TO15	Freon-113	0.2	ppbV
TO15	Freon-114	1.4	ug/m3		TO15	Freon-114	0.2	ppbV
TO15	Heptane	0.82	ug/m3		TO15	Heptane	0.2	ppbV
TO15	Hexachlorobutadiene	2.13	ug/m3		TO15	Hexachlorobutadiene	0.2	ppbV
TO15	Isopropanol	1.23	ug/m3		TO15	Isopropanol	0.5	ppbV
TO15	Methyl tert butyl ether	0.721	ug/m3		TO15	Methyl tert butyl ether	0.2	ppbV
TO15	Methylene chloride	1.74	ug/m3		TO15	Methylene chloride	0.5	ppbV
TO15	n-Hexane	0.705	ug/m3		TO15	n-Hexane	0.2	ppbV
TO15	o-Xylene	0.869	ug/m3		TO15	o-Xylene	0.2	ppbV
TO15	p/m-Xylene	1.74	ug/m3		TO15	p/m-Xylene	0.4	ppbV
TO15	Styrene	0.852	ug/m3		TO15	Styrene	0.2	ppbV
TO15	Tertiary butyl Alcohol	1.52	ug/m3		TO15	Tertiary butyl Alcohol	0.5	ppbV
TO15	Tetrachloroethene	1.36	ug/m3		TO15	Tetrachloroethene	0.2	ppbV
TO15	Tetrahydrofuran	1.47	ug/m3		TO15	Tetrahydrofuran	0.5	ppbV
TO15	Toluene	0.754	ug/m3		TO15	Toluene	0.2	ppbV
TO15	trans-1,2-Dichloroethene	0.793	ug/m3		TO15	trans-1,2-Dichloroethene	0.2	ppbV
TO15	trans-1,3-Dichloropropene	0.908	ug/m3		TO15	trans-1,3-Dichloropropene	0.2	ppbV
TO15	Trichloroethene	1.07	ug/m3		TO15	Trichloroethene	0.2	ppbV
TO15	Trichlorofluoromethane	1.12	ug/m3		TO15	Trichlorofluoromethane	0.2	ppbV
TO15	Vinyl bromide	0.874	ug/m3		TO15	Vinyl bromide	0.2	ppbV
TO15	Vinyl chloride	0.511	ug/m3		TO15	Vinyl chloride	0.2	ppbV

ATTACHMENT C

ANALYTICAL METHODS/QUALITY ASSURANCE SUMMARY TABLE

Matrix Type	Field Parameters	Laboratory Parameters	Analytical Methods	Sample Preservation	Sample Container Volume and Type	Sample Hold Time	Field Duplicate Samples	Equipment Blank Samples	Trip Blank Samples	Ambient Air Samples	MS/MSD Samples
Groundwater	Temperature, Turbidity, pH, ORP, Conductivity	Part 375 + TCL VOCs	EPA 8260C	Cool to 4°C; HCl to pH <2;no headspace	Three 40-mL VOC vials with Teflon®-lined cap	Analyze within 14 days of collection	1 per 20 samples (minimum 1)	1 per 20 samples (minimum 1)	1 per shipment of VOC samples	NA	1 per 20 samples
		1,4-dioxane	8270D SIM isotope dilution	Cool to 4°C	Two 250mL Amber Glass	7 days to extract, 40 days after extraction to analysis					
		Part 375 + TCL SVOCs	EPA 8270D	Cool to 4°C	Two 250mL Amber Glass	7 days to extract, 40 days after extraction to analysis					
		Part 375 + TAL Metals	EPA 6020B, EPA 7470A	Cool to 4°C; HNO_3	250 ml plastic	180 days, except Mercury 28 days					
		Hexavalent Chromium	EPA 7196A	Cool to 4°C	250 ml plastic	24 hours					
		Cyanide	EPA 9010C/9012B	Cool to 4°C; NaOH	250 ml plastic	14 days					
		Part 375 + TCL Herbicides	EPA 8151A	Cool to 4°C	Two 1-Liter Amber Glass	7 days to extract, 40 days after extraction to analysis					
		Part 375 + TCL Pesticides	EPA 8081B	Cool to 4°C	Two 120mL Amber Glass for Pesticides/PCB each	7 days to extract, 40 days after extraction to analysis					
		Part 375 + TCL PCBs	EPA 8082A	Cool to 4°C		365 days to extract, 40 days after extraction to analysis					
		Per- and polyfluoroalykl substances (PFAS)	EPA 1633 Draft	Cool to 4°C	Three 500mL plastic	28 days	1 per 20 samples (minimum 1)	1 per 20 samples (minimum 1)	NA	NA	1 per 20 samples (minimum 1)
Soil	Total VOCs via PID	Part 375 + TCL VOCs	EPA 8260C	Cool to 4°C	Two 40-ml VOC vials with 5ml H_2O, one with MeOH or 3 En Core Samplers (separate container for % solids)	48 hours after sampling if samples are not frozen to -7° C, 14 days after extraction to analysis	1 per 20 samples (minimum 1)	1 per 20 samples (minimum 1)	1 per shipment of VOC samples	NA	1 per 20 samples
		Part 375 + TCL SVOCs	EPA 8270D	Cool to 4°C	4 oz. amber glass jar	14 days extract, 40 days after extraction to analysis			NA		
		Part 375 + TAL Metals	EPA 6010D, EPA 7471B, EPA 7196A, EPA 9010C/9012B	Cool to 4°C	2 oz. amber glass jar	180 days, except mercury 28 days					
		Hexavalent Chromium	EPA 7196A	Cool to 4°C	4 oz. amber glass jar	30 days					
		Cyanide	EPA 9010C/9012B	Cool to 4°C	8 oz. amber glass jar	14 days					
		Part 375 + TCL Pesticides	EPA 8081B	Cool to 4°C	4 oz. amber glass jar	14 days extract, 40 days after extraction to analysis					
		Part 375 + TCL Herbicides	EPA 8151A	Cool to 4°C	4 oz. amber glass jar	14 days extract, 40 days after extraction to analysis					
		Part 375 + TCL PCBs	EPA 8082A	Cool to 4°C	4 oz. amber glass jar	365 days extract, 40 days after extraction to analysis					
		Per- and polyfluoroalykl substances (PFAS)	EPA 1633 Draft	Cool to 4°C	8 oz. plastic	90 days					
Soil Vapor	Total VOCs and Methane with MultiGas Meter	TO-15 Listed VOCs	TO-15	Ambient Temperature	6-Liter Summa Canister	Analyze within 30 days of collection	1 per 20 samples (minimum 1)	NA	NA	1 per 10 samples (minimum 1)	NA
Ambient Air	Total VOCs via PID	TO-15 Listed VOCs	TO-15	Ambient Temperature	6-Liter Summa Canister	Analyze within 30 days of collection	1 per 20 samples (minimum 1)	NA	NA	1 per 10 samples (minimum 1)	NA

Notes:
1. PID - Photoionization Detector
2. VOC - Volatile organic compound
3. EPA - Environmental Protection Agency
4. TCL - Target compound list
5. TAL - Target analyte list
6. ORP - Oxidation-reduction-potential
7. NA - Not applicable

ATTACHMENT C

ANALYTICAL METHODS/QUALITY ASSURANCE SUMMARY TABLE

ATTACHMENT D

SAMPLE NOMENCLATURE STANDARD OPERATING PROCEDURE

SOP #01 – Sample Nomenclature

INTRODUCTION

The Langan Environmental Group conducts an assortment of site investigations where samples (Vapor, Solids, and Aqueous) are collected and submitted to analytical laboratories for analysis. The results of which are then evaluated and entered into a data base allowing quick submittal to the state regulatory authority (New York State Division of Environmental Conservation [NYSDEC]). In addition, Langan is linking their data management system to graphic and analytical software to enable efficient evaluation of the data as well as creating client-ready presentational material.

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the general framework for labeling vapor, solid (soil) and aqueous (groundwater) samples that will be submitted for laboratory analysis. The nomenclature being introduced is designed to meet the NYSDEC EQuIS standard and has been incorporated into Langan software scripts to assist project personnel in processing the data. While this SOP is applicable to all site investigation; unanticipated conditions may arise which may require considerable flexibility in complying with this SOP. Therefore, guidance provided in this SOP is presented in terms of general steps and strategies that should be applied; but deviation from this SOP must be reported to the Project Manager (PM) immediately.

GENERAL SAMPLE IDENTIFICATION CONSIDERATIONS

Sample Labels

All sample ware must have a label. Recall that when you are using the Encore™ samples (see below); they are delivered in plastic lined foil bags. You are to label the bags[1]:



All other samples containers including Terra Cores™ must be labeled with laboratory provided self-adhesive labels.

Quick Breakdown of Sample Format

The general format for sample nomenclature is:

[1]Both Alpha and York laboratories permit the combining of the three Encore™ into a single bag. This may not be appropriate for all laboratories so please confirm with the labs themselves

LLNN_ID

Where

LL is a grouping of two (2) to four (4) letters signifying the sample media source. In older nomenclature SOPs this portion of the sample identification is commonly referred to as the *Sample Investigation Code*

NN represents a two digit number identifying the specific sample location or sample sequence number

_ ***(underscore)*** is required between the sample lettering and numeric identification and additional modifying data that determines the date of sampling or the depth of the sample interval

ID is a modifier specific to the sample type media (depth of soil sample or date of groundwater sample)

LL – Sample Investigation Code

Langan has devised a list of two to four letters to insure a quick ability to identify the sample investigation.

Code	Investigation
AA	Ambient Air
DS	Drum
EPB	Endpoint Location - Bottom (Excavation)
EPSW	Endpoint Location - Sidewall (Excavation)
FP	Free Product
IA	Indoor Air
IDW	Investigation Derived Waste (Soil Pile)
MW	Monitoring Well (Permanent)
SB	Soil Boring
SG	Staff Gauge (Stream Gauging)
SL	Sludge
SV	Soil Vapor Point
SVE	Soil Vapor Extraction Well
SW	Surface Water
TMW	Temporary Monitoring Well
TP	Test Pit (Excavated Material from Test Pit Not Associated With Sidewall or Bottom Samples)
WC	Waste Characterization Boring
COMP	Composite Sample
TB	Trip Blank (QA/QC Sampling – All Investigations)
FB	Field Blank (QA/QC Sampling – All Investigations)
DUP	Duplicate (QA/QC Sampling – All Investigations)

NN – Numeric Identifier

The two digit number that follows the sample investigation code (LL) identifies the specific sample based on the soil boring, monitoring well, endpoint or other location identification. For a subset of samples

where there is no specific location identifier, the two digit number is the sequence number for the sample submitted. For example, an aqueous sample from a monitoring well identified as MW-1 would have the sample investigation code of MW and the numeric identifier as 01. Note there is no hyphen. The same can be done for soil borings, a soil sample collected from soil boring 9 (SB-9) would be have the LLNN identification of SB09 (again, no hyphen).

Note however that there is a subset of samples related to laboratory analytical quality assurance, among these includes TB, FB, and DUP. On many investigations, the Scope will require multiple collections of these types of samples, therefore the numerical number represents the sequence sample count where the first sample is 01, the second sample is 02, and the third sample is 03 and so on.

_ Underscore
The underscore is required. It separates the investigation code and numeric identifier from the modifier specific to the sample itself. Note that every effort should be made to insure that the underscore is clear on the sample label and chain of custody (COC).

ID – Modifier Specific to Type Media
Each sample investigation code and numeric identifier is further modified by an ID specific to the sample type media. In general, soil samples (soil borings or endpoint samples) use an ID that indicates the depth at which the sample was taken. Aqueous samples (groundwater or surface water samples) are identified by the date the sample was collected. Other types of samples including quality control (TB, FB, and DUP), Vapor samples (AA, IA, SV or SVE), other soil type samples (IDW, sludge, free product, drum, and others) are also identified by a date. The following rules apply to the ID when using sample depth or sample date.

Sample Depth
The sample depth must be whole numbers (no fractions) separated by a hyphen. Thus for a soil sample collected from the soil boring SB-1 from a depth of 6 feet to 8 feet, the sample would be identified as:

SB01_6-8

Unfortunately, the NYSDEC EQuIS system does not accept fractions. Therefore, if your sample interval is a fraction of a foot (6.5-7.5), round up to the larger interval (6-8).

Sample Date
The sample date is always in the format of MMDDYY. Note that the year is two digits. Thus for a groundwater sample collected on July 1, 2015 from the monitoring well MW-1, the sample would be identified as:

MW01_070115

Special Cases
There are a couple of specific sample types that require further explanation.

Endpoint Sampling
End point sidewall samples are sometimes modified by magnetic direction (N, S, E, and W). For example, the first sidewall endpoint sample from the north wall of an excavation at a depth of 5 feet would be written as:

EPSW01_N_5

Again, note that the N in the identification refers to north and is separated from the prefix investigation code/numeric identifier and ID modifier suffix by underscores.

Vapor Extraction Well Sample
As with the sidewall endpoint samples, the sample name is altered by inserting a middle modifier between the prefix and suffix of the sample name. The middle modifier is used to identify the source of the sample (inlet sample port, midpoint sample port or outlet sample port). For example the midpoint port of the vapor extraction well number 1 sampled on July 1, 2015 would be written as;

SVE01_MID_070115

Matrix Spike and Matrix Spike Duplicate
On occasion, a Langan investigation will collect a sample to be used to provide the lab with a site specific medium to spike to determine the quality of the analytical method. This special case of sampling requires additional information to be used in the sample name, specifically, a suffix specifying whether the sample is the matrix spike (MS) or the matrix spike duplicate (MSD). In the following example, the sample is collected from soil boring number 1 at a depth of 2-4 feet. For the matrix spike sample:

SB01_2-4_MS

and for the matrix spike duplicate sample:

SB01_2-4_MSD

Multiple Interval Groundwater Sampling
Although not currently a common practice, low flow sampling facilitates stratigraphic sampling of a monitoring well. If the scope requires stratigraphic sampling then groundwater samples will be labeled with a lower case letter following the well number. For example, placing the pump or sampling tube at 10 feet below surface in MW01 on July 1, 2015 would require the sample to be labeled as:

MW01a_070115

While a second sample where the pump or tubing intake is placed at 20 feet would be labeled as:

MW01b_070115

Note that it is important that you record what depth the intake for each sample represents in your field notes; as this information is going to be critical to interpreting the results.

ATTACHMENT E

PER- AND POLYFLUOROALKYL SUBSTANCES SAMPLING PROTOCOL

NEW YORK STATE OF OPPORTUNITY.

Department of Environmental Conservation

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Under NYSDEC's Part 375 Remedial Programs

April 2023



www.dec.ny.gov

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ERRATA SHEET for

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) Under NYSDEC's Part 375 Remedial Programs Issued January 17, 2020

Citation and Page Number	Current Text	Corrected Text	Date
Title of Appendix I, page 32	Appendix H	Appendix I	2/25/2020
Document Cover, page 1	Guidelines for Sampling and Analysis of PFAS	Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs	9/15/2020
Data Assessment and Application to Site Cleanup Page 3	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published	Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published	3/28/2023
Water Sample Results Page 3	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt) and is determined to be attributable to the site, either by a comparison of upgradient and downgradient levels, or the presence of soil source areas, as defined below.	NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These guidance values also include criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt).Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.	3/28/2023
Soil Sample Results Page 3	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values:	NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:	3/28/2023
Protection of Groundwater Page 3	PFOA (ppb) 1.1 PFOS (ppb) 3.7	PFOA (ppb) 0.8 PFOS (ppb) 1.0	3/28/2023

Citation and Page Number	Current Text	Corrected Text	Date
Footnote 2 Page 3	The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	3/28/2023
Testing for Imported Soil Page 4	If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.	If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.	3/28/2023
Routine Analysis, page 9	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1 or ISO 25101."	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533."	9/15/2020
Additional Analysis, page 9, new paragraph regarding soil parameters	None	"In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils."	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Data Assessment and Application to Site Cleanup Page 10	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Target levels for cleanup of PFAS in other media, including biota and sediment, have not yet been established by the DEC.	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.	9/15/2020
Water Sample Results Page 10	PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water (…) If PFAS are identified as a contaminant of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water (…) If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Soil Sample Results, page 10	"The extent of soil contamination for purposes of delineation and remedy selection should be determined by having certain soil samples tested by Synthetic Precipitation Leaching Procedure (SPLP) and the leachate analyzed for PFAS. Soil exhibiting SPLP results above 70 ppt for either PFOA or PFOS (individually or combined) are to be evaluated during the cleanup phase."	"Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values. " [Interim SCO Table] "PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP. As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf. "	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Testing for Imported Soil Page 11	Soil imported to a site for use in a soil cap, soil cover, or as backfill is to be tested for PFAS in general conformance with DER-10, Section 5.4(e) for the PFAS Analyte List (Appendix F) using the analytical procedures discussed below and the criteria in DER-10 associated with SVOCs. If PFOA or PFOS is detected in any sample at or above 1 µg/kg, then soil should be tested by SPLP and the leachate analyzed for PFAS. If the SPLP results exceed 10 ppt for either PFOA or PFOS (individually) then the source of backfill should be rejected, unless a site-specific exemption is provided by DER. SPLP leachate criteria is based on the Maximum Contaminant Levels proposed for drinking water by New York State's Department of Health, this value may be updated based on future Federal or State promulgated regulatory standards. Remedial parties have the option of analyzing samples concurrently for both PFAS in soil and in the SPLP leachate to minimize project delays. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable. PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Footnotes	None	[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances. [2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the soil cleanup objective for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	9/15/2020
Additional Analysis, page 9	In cases… soil parameters, such as Total Organic Carbon (EPA Method 9060), soil…	In cases… soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil…	1/8/2021
Appendix A, General Guidelines, fourth bullet	List the ELAP-approved lab(s) to be used for analysis of samples	List the ELAP- certified lab(s) to be used for analysis of samples	1/8/2021
Appendix E, Laboratory Analysis and Containers	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101.	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101	1/8/2021
Water Sample Results Page 9	"In addition, further assessment of water may be warranted if either of the following screening levels are met: a. any other individual PFAS (not PFOA or PFOS) is detected in water at or above 100 ng/L; or b. total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 500 ng/L"	Deleted	6/15/2021

Citation and Page Number	Current Text	Corrected Text	Date
Routine Analysis, Page XX	Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP)… criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids).	Deleted	5/31/2022
Analysis and Reporting, Page XX	As of October 2020, the United States Environmental Protection Agency (EPA) does not have a validated method for analysis of PFAS for media commonly analyzed under DER remedial programs (non-potable waters, solids). DER has developed the following guidelines to ensure consistency in analysis and reporting of PFAS.	Deleted	5/31/2022
Routine Analysis, Page XX	LC-MS/MS analysis for PFAS using methodologies based on EPA Method 537.1 is the procedure to use for environmental samples. Isotope dilution techniques should be utilized for the analysis of PFAS in all media.	EPA Method 1633 is the procedure to use for environmental samples.	
Soil Sample Results, Page XX	Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6	
Appendix A	"Include in the text… LC-MS/MS for PFAS using methodologies based on EPA Method 537.1"	"Include in the text ….EPA Method 1633"	
Appendix A	"Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101"	Deleted	
Appendix B	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	

Citation and Page Number	Current Text	Corrected Text	Date
Appendix C	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	
Appendix D	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	
Appendix G		Updated to include all forty PFAS analytes in EPA Method 533	
Appendix H		Deleted	
Appendix I	Appendix I	Appendix H	
Appendix H	"These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report."	"These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER)."	
Appendix H	"The holding time is 14 days…"	"The holding time is 28 days…"	
Appendix H, Initial Calibration	"The initial calibration should contain a minimum of five standards for linear fit…"	"The initial calibration should contain a minimum of six standards for linear fit…"	
Appendix H, Initial Calibration	Linear fit calibration curves should have an R^2 value greater than 0.990.	Deleted	
Appendix H, Initial Calibration Verification	Initial Calibration Verification Section	Deleted	
Appendix H	secondary Ion Monitoring Section	Deleted	
Appendix H	Branched and Linear Isomers Section	Deleted	

Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs

Objective

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) performs or oversees sampling of environmental media and subsequent analysis of PFAS as part of remedial programs implemented under 6 NYCRR Part 375. To ensure consistency in sampling, analysis, reporting, and assessment of PFAS, DER has developed this document which summarizes currently accepted procedures and updates previous DER technical guidance pertaining to PFAS.

Applicability

All work plans submitted to DEC pursuant to one of the remedial programs under Part 375 shall include PFAS sampling and analysis procedures that conform to the guidelines provided herein.

As part of a site investigation or remedial action compliance program, whenever samples of potentially affected media are collected and analyzed for the standard Target Analyte List/Target Compound List (TAL/TCL), PFAS analysis should also be performed. Potentially affected media can include soil, groundwater, surface water, and sediment. Based upon the potential for biota to be affected, biota sampling and analysis for PFAS may also be warranted as determined pursuant to a Fish and Wildlife Impact Analysis. Soil vapor sampling for PFAS is not required.

Field Sampling Procedures

DER-10 specifies technical guidance applicable to DER's remedial programs. Given the prevalence and use of PFAS, DER has developed "best management practices" specific to sampling for PFAS. As specified in DER-10 Chapter 2, quality assurance procedures are to be submitted with investigation work plans. Typically, these procedures are incorporated into a work plan, or submitted as a stand-alone document (e.g., a Quality Assurance Project Plan). Quality assurance guidelines for PFAS are listed in Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS.

Field sampling for PFAS performed under DER remedial programs should follow the appropriate procedures outlined for soils, sediments, or other solids (Appendix B), non-potable groundwater (Appendix C), surface water (Appendix D), public or private water supply wells (Appendix E), and fish tissue (Appendix F).

QA/QC samples (e.g. duplicates, MS/MSD) should be collected as specified in DER-10, Section 2.3(c). For sampling equipment coming in contact with aqueous samples only, rinsate or equipment blanks should be collected. Equipment blanks should be collected at a minimum frequency of one per day per site or one per twenty samples, whichever is more frequent.

Analysis and Reporting

The investigation work plan should describe analysis and reporting procedures, including laboratory analytical procedures for the methods discussed below. As specified in DER-10 Section 2.2, laboratories should provide a full Category B deliverable. In addition, a Data Usability Summary Report (DUSR) should be prepared by an independent, third-party data validator. Electronic data submissions should meet the requirements provided at: https://www.dec.ny.gov/chemical/62440.html.

DER has developed a *PFAS Analyte List* (Appendix G) for remedial programs to understand the nature of contamination at sites. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. If lab and/or matrix specific issues are encountered for any analytes, the DER project manager, in consultation with the DER chemist, will make case-by-case decisions as to whether certain analytes may be temporarily or permanently discontinued from analysis at each site. As with other contaminants that are analyzed for at a site, the *PFAS Analyte List* may be refined for future sampling events based on investigative findings.

Routine Analysis

EPA Method 1633 is the procedure to use for environmental samples. Reporting limits for PFOA and PFOS in aqueous samples should not exceed 2 ng/L. Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg. Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire *PFAS Analyte List*, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist. Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

Additional Analysis

Additional laboratory methods for analysis of PFAS may be warranted at a site, such as the Synthetic Precipitation Leaching Procedure (SPLP) and Total Oxidizable Precursor Assay (TOP Assay).

In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils.

SPLP is a technique used to determine the mobility of chemicals in liquids, soils and wastes, and may be useful in determining the need for addressing PFAS-containing material as part of the remedy. SPLP by EPA Method 1312 should be used unless otherwise specified by the DER project manager in consultation with the DER chemist.

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.[1]

[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.

Commercial laboratories have adopted methods which allow for the quantification of targeted PFAS in air and biota. The EPA's Office of Research and Development (ORD) is currently developing methods which allow for air emissions characterization of PFAS, including both targeted and non-targeted analysis of PFAS. Consult with the DER project manager and the DER chemist for assistance on analyzing biota/tissue and air samples.

Data Assessment and Application to Site Cleanup

Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.

Water Sample Results

NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These human health criteria should also be applied to surface water that is used as a water supply. This guidance also includes criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt). Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.

If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.

Soil Sample Results

NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:

Guidance Values for Anticipated Site Use	PFOA (ppb)	PFOS (ppb)
Unrestricted	0.66	0.88
Residential	6.6	8.8
Restricted Residential	33	44
Commercial	500	440
Industrial	600	440
Protection of Groundwater[2]	0.8	1.0

PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These

[2] The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).

additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.

As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf.

Testing for Imported Soil

Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.

PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.

Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS

The following guidelines (general and PFAS-specific) can be used to assist with the development of a QAPP for projects within DER involving sampling and analysis of PFAS.

General Guidelines in Accordance with DER-10

- Document/work plan section title – Quality Assurance Project Plan
- Summarize project scope, goals, and objectives
- Provide project organization including names and resumes of the project manager, Quality Assurance Officer (QAO), field staff, and Data Validator
    - The QAO should not have another position on the project, such as project or task manager, that involves project productivity or profitability as a job performance criterion
- List the ELAP certified lab(s) to be used for analysis of samples
- Include a site map showing sample locations
- Provide detailed sampling procedures for each matrix
- Include Data Quality Usability Objectives
- List equipment decontamination procedures
- Include an "Analytical Methods/Quality Assurance Summary Table" specifying:
    - Matrix type
    - Number or frequency of samples to be collected per matrix
    - Number of field and trip blanks per matrix
    - Analytical parameters to be measured per matrix
    - Analytical methods to be used per matrix with minimum reporting limits
    - Number and type of matrix spike and matrix spike duplicate samples to be collected
    - Number and type of duplicate samples to be collected
    - Sample preservation to be used per analytical method and sample matrix
    - Sample container volume and type to be used per analytical method and sample matrix
    - Sample holding time to be used per analytical method and sample matrix
- Specify Category B laboratory data deliverables and preparation of a DUSR

Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by EPA Method 1633
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
-
- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment
- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per site for each matrix

Appendix B - Sampling Protocols for PFAS in Soils, Sediments and Solids

General

The objective of this protocol is to give general guidelines for the collection of soil, sediment and other solid samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Containers

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in to contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel spoon
- stainless steel bowl
- steel hand auger or shovel without any coatings

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Sampling is often conducted in areas where a vegetative turf has been established. In these cases, a pre-cleaned trowel or shovel should be used to carefully remove the turf so that it may be replaced at the conclusion of sampling. Surface soil samples (e.g. 0 to 6 inches below surface) should then be collected using a pre-cleaned, stainless steel spoon. Shallow subsurface soil samples (e.g. 6 to ~36 inches below surface) may be collected by digging a hole using a pre-cleaned hand auger or shovel. When the desired subsurface depth is reached, a pre-cleaned hand auger or spoon shall be used to obtain the sample.

When the sample is obtained, it should be deposited into a stainless steel bowl for mixing prior to filling the sample containers. The soil should be placed directly into the bowl and mixed thoroughly by rolling the material into the middle until the material is homogenized. At this point the material within the bowl can be placed into the laboratory provided container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A soil log or sample log shall document the location of the sample/borehole, depth of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

The objective of this protocol is to give general guidelines for the collection of groundwater samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including plumbers tape and sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel inertia pump with HDPE tubing
- peristaltic pump equipped with HDPE tubing and silicone tubing
- stainless steel bailer with stainless steel ball
- bladder pump (identified as PFAS-free) with HDPE tubing

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Monitoring wells should be purged in accordance with the sampling procedure (standard/volume purge or low flow purge) identified in the site work plan, which will determine the appropriate time to collect the sample. If sampling using standard purge techniques, additional purging may be needed to reduce turbidity levels, so samples contain a limited amount of sediment within the sample containers. Sample containers that contain sediment may cause issues at the laboratory, which may result in elevated reporting limits and other issues during the sample preparation that can compromise data usability. Sampling personnel should don new nitrile gloves prior to sample collection due to the potential to contact PFAS containing items (not related to the sampling equipment) during the purging activities.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Additional equipment blank samples may be collected to assess other equipment that is utilized at the monitoring well
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A purge log shall document the location of the sample, sampling equipment, groundwater parameters, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix D - Sampling Protocols for PFAS in Surface Water

General

The objective of this protocol is to give general guidelines for the collection of surface water samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel cup

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Where conditions permit, (e.g. creek or pond) sampling devices (e.g. stainless steel cup) should be rinsed with site medium to be sampled prior to collection of the sample. At this point the sample can be collected and poured into the sample container.

If site conditions permit, samples can be collected directly into the laboratory container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A sample log shall document the location of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix E - Sampling Protocols for PFAS in Private Water Supply Wells

General

The objective of this protocol is to give general guidelines for the collection of water samples from private water supply wells (with a functioning pump) for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101. The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials (e.g. plumbers tape), including sample bottle cap liners with a PTFE layer.

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Locate and assess the pressure tank and determine if any filter units are present within the building. Establish the sample location as close to the well pump as possible, which is typically the spigot at the pressure tank. Ensure sampling equipment is kept clean during sampling as access to the pressure tank spigot, which is likely located close to the ground, may be obstructed and may hinder sample collection.

Prior to sampling, a faucet downstream of the pressure tank (e.g., washroom sink) should be run until the well pump comes on and a decrease in water temperature is noted which indicates that the water is coming from the well. If the homeowner is amenable, staff should run the water longer to purge the well (15+ minutes) to provide a sample representative of the water in the formation rather than standing water in the well and piping system including the pressure tank. At this point a new pair of nitrile gloves should be donned and the sample can be collected from the sample point at the pressure tank.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- If equipment was used, collect one equipment blank per day per site and a minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers.
- A field reagent blank (FRB) should be collected at a rate of one per 20 samples. The lab will provide a FRB bottle containing PFAS free water and one empty FRB bottle. In the field, pour the water from the one bottle into the empty FRB bottle and label appropriately.
- Request appropriate data deliverable (Category B) and an electronic data deliverable
- For sampling events where multiple private wells (homes or sites) are to be sampled per day, it is acceptable to collect QC samples at a rate of one per 20 across multiple sites or days.

Documentation

A sample log shall document the location of the private well, sample point location, owner contact information, sampling equipment, purge duration, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate and available (e.g. well construction, pump type and location, yield, installation date). Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appendix F - Sampling Protocols for PFAS in Fish

This appendix contains a copy of the current SOP developed by the Division of Fish and Wildlife (DFW) entitled "General Fish Handling Procedures for Contaminant Analysis" (Ver. 8). This SOP should be followed when collecting fish for contaminant analysis. Note, however, that the Bureau of Ecosystem Health will not be supplying bags or tags. All supplies are the responsibility of the collector

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

Purpose: This procedure describes data collection, fish processing and delivery of fish collected for contaminant monitoring. It contains the chain of custody and collection record forms that should be used for the collections.

Organization: Environmental Monitoring Section
Bureau of Ecosystem Health
Division of Fish and Wildlife (DFW)
New York State Department of Environmental Conservation (NYSDEC)
625 Broadway
Albany, New York 12233-4756

Version: 8

Previous Version Date: 21 March 2018

Summary of Changes to this Version: Updated bureau name to Bureau of Ecosystem Health. Added direction to list the names of all field crew on the collection record. Minor formatting changes on chain of custody and collection records.

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

Quality Assurance Officer and Approval Date: Jesse Becker, 26 April 2019

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

A. Original copies of all continuity of evidence (i.e., Chain of Custody) and collection record forms must accompany delivery of fish to the lab. A copy shall be directed to the Project Leader or as appropriate, Wayne Richter. All necessary forms will be supplied by the Bureau of Ecosystem Health. Because some samples may be used in legal cases, it is critical that each section is filled out completely. Each Chain of Custody form has three main sections:

   1. The top box is to be filled out **and signed** by the person responsible for the fish collection (e.g., crew leader, field biologist, researcher). This person is responsible for delivery of the samples to DEC facilities or personnel (e.g., regional office or biologist).

   2. The second section is to be filled out **and signed** by the person responsible for the collections while being stored at DEC, before delivery to the analytical lab. This may be the same person as in (1), but it is still required that they complete the section. Also important is the **range of identification numbers** (i.e., tag numbers) included in the sample batch.

   3. Finally, the bottom box is to record any transfers between DEC personnel and facilities. Each subsequent transfer should be **identified, signed, and dated**, until laboratory personnel take possession of the fish.

B. The following data are required on each **Fish Collection Record** form:

   1. Project and Site Name.

   2. DEC Region.

   3. All personnel (and affiliation) involved in the collection.

   4. Method of collection (gill net, hook and line, etc.)

   5. Preservation Method.

C. The following data are to be taken on each fish collected and recorded on the **Fish Collection Record** form:

   1. Tag number - Each specimen is to be individually jaw tagged at time of collection with a unique number. Make sure the tag is turned out so that the number can be read without opening the bag. Use tags in sequential order. For small fish or composite samples place the tag inside the bag with the samples. The Bureau of Ecosystem Health can supply the tags.

   2. Species identification (please be explicit enough to enable assigning genus and species). Group fish by species when processing.

   3. Date collected.

   4. Sample location (waterway and nearest prominent identifiable landmark).

   5. Total length (nearest mm or smallest sub-unit on measuring instrument) and weight (nearest g or

smallest sub-unit of weight on weighing instrument). Take all measures as soon as possible with calibrated, protected instruments (e.g. from wind and upsets) and prior to freezing.

6. Sex - fish may be cut enough to allow sexing or other internal investigation, but do not eviscerate. Make any incision on the right side of the belly flap or exactly down the midline so that a left-side fillet can be removed.

D. General data collection recommendations:

1. It is helpful to use an ID or tag number that will be unique. It is best to use metal striped bass or other uniquely numbered metal tags. If uniquely numbered tags are unavailable, values based on the region, water body and year are likely to be unique: for example, R7CAY11001 for Region 7, Cayuga Lake, 2011, fish 1. If the fish are just numbered 1 through 20, we have to give them new numbers for our database, making it more difficult to trace your fish to their analytical results and creating an additional possibility for errors.

2. Process and record fish of the same species sequentially. Recording mistakes are less likely when all fish from a species are processed together. Starting with the bigger fish species helps avoid missing an individual.

3. If using Bureau of Ecosystem Health supplied tags or other numbered tags, use tags in sequence so that fish are recorded with sequential Tag Numbers. This makes data entry and login at the lab and use of the data in the future easier and reduces keypunch errors.

4. Record length and weight as soon as possible after collection and before freezing. Other data are recorded in the field upon collection. An age determination of each fish is optional, but if done, it is recorded in the appropriate “Age” column.

5. For composite samples of small fish, record the number of fish in the composite in the Remarks column. Record the length and weight of each individual in a composite. All fish in a composite sample should be of the same species and members of a composite should be visually matched for size.

6. Please submit photocopies of topographic maps or good quality navigation charts indicating sampling locations. GPS coordinates can be entered in the Location column of the collection record form in addition to or instead for providing a map. These records are of immense help to us (and hopefully you) in providing documented location records which are not dependent on memory and/or the same collection crew. In addition, they may be helpful for contaminant source trackdown and remediation/control efforts of the Department.

7. When recording data on fish measurements, it will help to ensure correct data recording for the data recorder to call back the numbers to the person making the measurements.

E. Each fish is to be placed in its own individual plastic bag. For small fish to be analyzed as a composite, put all of the fish for one composite in the same bag but use a separate bag for each composite. It is important to individually bag the fish to avoid difficulties or cross contamination when processing the fish for chemical analysis. Be sure to include the fish’s tag number inside the bag, preferably attached to the fish with the tag number turned out so it can be read. Tie or otherwise secure the bag closed. **The Bureau of Ecosystem Health will supply the bags.** If necessary, food grade bags may be procured from a suitable vendor (e.g., grocery store). It is preferable to redundantly label each bag with a manila tag tied between the knot and the body of the bag. This tag should be labeled with the project name, collection location, tag number, collection date, and fish species. If scales are collected, the scale envelope should be labeled with

the same information.

F. Groups of fish, by species, are to be placed in one large plastic bag per sampling location. **The Bureau of Ecosystem Health will supply the larger bags.** Tie or otherwise secure the bag closed. Label the site bag with a manila tag tied between the knot and the body of the bag. The tag should contain: project, collection location, collection date, species and **tag number ranges**. Having this information on the manila tag enables lab staff to know what is in the bag without opening it.

G. Do not eviscerate, fillet or otherwise dissect the fish unless specifically asked to. If evisceration or dissection is specified, the fish must be cut along the exact midline or on the right side so that the left side fillet can be removed intact at the laboratory. If filleting is specified, the procedure for taking a standard fillet (SOP PREPLAB 4) must be followed, including removing scales.

H. Special procedures for PFAS: Unlike legacy contaminants such as PCBs, which are rarely found in day to day life, PFAS are widely used and frequently encountered. Practices that avoid sample contamination are therefore necessary. While no standard practices have been established for fish, procedures for water quality sampling can provide guidance. The following practices should be used for collections when fish are to be analyzed for PFAS:

No materials containing Teflon.
No Post-it notes.
No ice packs; only water ice or dry ice.
Any gloves worn must be powder free nitrile.
No Gore-Tex or similar materials (Gore-Tex is a PFC with PFOA used in its manufacture).
No stain repellent or waterproof treated clothing; these are likely to contain PFCs.
Avoid plastic materials, other than HDPE, including clipboards and waterproof notebooks.
Wash hands after handling any food containers or packages as these may contain PFCs.
Keep pre-wrapped food containers and wrappers isolated from fish handling.
Wear clothing washed at least six times since purchase.
Wear clothing washed without fabric softener.
Staff should avoid cosmetics, moisturizers, hand creams and similar products on the day of sampling as many of these products contain PFCs (Fujii et al. 2013). Sunscreen or insect repellent should not contain ingredients with “fluor” in their name. Apply any sunscreen or insect repellent well downwind from all materials. Hands must be washed after touching any of these products.

I. All fish must be kept at a temperature <45° F (<8° C) immediately following data processing. As soon as possible, freeze at -20° C ± 5° C. Due to occasional freezer failures, daily freezer temperature logs are required. The freezer should be locked or otherwise secured to maintain chain of custody.

J. In most cases, samples should be delivered to the Analytical Services Unit at the Hale Creek field station. Coordinate delivery with field station staff and send copies of the collection records, continuity of evidence forms and freezer temperature logs to the field station. For samples to be analyzed elsewhere, non-routine collections or other questions, contact Wayne Richter, Bureau of Ecosystem Health, NYSDEC, 625 Broadway, Albany, New York 12233-4756, 518-402-8974, or the project leader about sample transfer. Samples will then be directed to the analytical facility and personnel noted on specific project descriptions.

K. A recommended equipment list is at the end of this document.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF FISH AND WILDLIFE
FISH COLLECTION RECORD

Project and Site Name _____ DEC Region _____

Collections made by (include all crew) _____

Sampling Method: □Electrofishing □Gill netting □Trap netting □Trawling □Seining □Angling □Other _____

Preservation Method: □Freezing □Other _____ Notes (SWFDB survey number): _____

FOR LAB USE ONLY- LAB ENTRY NO.	COLLECTION OR TAG NO.	SPECIES	DATE TAKEN	LOCATION	AGE	SEX &/OR REPROD. CONDIT	LENGTH ( )	WEIGHT ( )	REMARKS

richter: revised 2011, 5/7/15, 10/4/16, 3/20/17; becker: 3/23/17, 4/26/19

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY

I, _____, of _____ collected the
(Print Name) (Print Business Address)

following on _____, 20____ from _____
(Date) (Water Body)

in the vicinity of _____
(Landmark, Village, Road, etc.)

Town of _____, in _____ County.

Item(s) _____

_____

Said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on _____, 20_____.

_____ _____
Signature Date

I, _____, received the above mentioned sample(s) on the date specified and assigned identification number(s) _____ to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and on dates as attested to below.

_____ _____
Signature Date

SECOND RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME & DATE	REMARKS
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME & DATE	ACCESSION NUMBERS
SIGNATURE	UNIT	

richter: revised 21 April 2014; becker: 23 March 2017, 26 April, 2019

NOTICE OF WARRANTY

By signature to the chain of custody (reverse), the signatory warrants that the information provided is truthful and accurate to the best of his/her ability. The signatory affirms that he/she is willing to testify to those facts provided and the circumstances surrounding the same. Nothing in this warranty or chain of custody negates responsibility nor liability of the signatories for the truthfulness and accuracy of the statements provided.

HANDLING INSTRUCTIONS

On day of collection, collector(s) name(s), address(es), date, geographic location of capture (attach a copy of topographic map or navigation chart), species, number kept of each species, and description of capture vicinity (proper noun, if possible) along with name of Town and County must be indicated on reverse.

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelops, approximately 2” x 3.5”, if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

Appendix G – PFAS Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonic acids	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluoropentanesulfonic acid	PFPeS	2706-91-4
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorononanesulfonic acid	PFNS	68259-12-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
	Perfluorododecanesulfonic acid	PFDoS	79780-39-5
Perfluoroalkyl carboxylic acids	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUnA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTeDA	376-06-7
Per- and Polyfluoroether carboxylic acids	Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
	4,8-Dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4
	Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
	Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5
	Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6
Fluorotelomer sulfonic acids	4:2 Fluorotelomer sulfonic acid	4:2-FTS	757124-72-4
	6:2 Fluorotelomer sulfonic acid	6:2-FTS	27619-97-2
	8:2 Fluorotelomer sulfonic acid	8:2-FTS	39108-34-4
Fluorotelomer carboxylic acids	3:3 Fluorotelomer carboxylic acid	3:3 FTCA	356-02-5
	5:3 Fluorotelomer carboxylic acid	5:3 FTCA	914637-49-3
	7:3 Fluorotelomer carboxylic acid	7:3 FTCA	812-70-4
Perfluorooctane sulfonamides	Perfluorooctane sulfonamide	PFOSA	754-91-6
	N-methylperfluorooctane sulfonamide	NMeFOSA	31506-32-8
	N-ethylperfluorooctane sulfonamide	NEtFOSA	4151-50-2
Perfluorooctane sulfonamidoacetic acids	N-methylperfluorooctane sulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethylperfluorooctane sulfonamidoacetic acid	N-EtFOSAA	2991-50-6
Perfluorooctane sulfonamide ethanols	N-methylperfluorooctane sulfonamidoethanol	MeFOSE	24448-09-7
	N-ethylperfluorooctane sulfonamidoethanol	EtFOSE	1691-99-2

Group	Chemical Name	Abbreviation	CAS Number
Ether sulfonic acids	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major)	9Cl-PF3ONS	756426-58-1
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	11Cl-PF3OUdS	763051-92-9
	Perfluoro(2-ethoxyethane) sulfonic acid	PFEESA	113507-82-7

Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER). Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov.

Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 28 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

Temperature greatly exceeds 6ºC upon arrival at the lab*	Use professional judgement to qualify detects and non-detects as estimated or rejected
Holding time exceeding 28 days to extraction	Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

Initial Calibration

The initial calibration should contain a minimum of six standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

%RSD >20%	J flag detects and UJ non detects

Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

CCV recovery <70 or >130%	J flag results

Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

Blank Result	Sample Result	Qualification
Any detection	<Reporting limit	Qualify as ND at reporting limit
Any detection	>Reporting Limit and >10x the blank result	No qualification
>Reporting limit	>Reporting limit and <10x blank result	J+ biased high

Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects

Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only
RPD >30%	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only

Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

Recovery <50% or >150%	Apply J qualifier
Recovery <25% or >150% for poor responding analytes	Apply J qualifier
Isotope Dilution Analyte (IDA) Recovery <10%	Reject results

Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

APPENDIX I

SITE MANAGEMENT FORMS

SITE INSPECTION CHECKLIST

Site Name: 1709 Surf Avenue Location: Brooklyn, New York Project Number: 170747001

Inspector Name: Date: Weather Conditions: _

Reason for Inspection (i.e., routine, severe weather condition, etc.):

Check one of the following:
(Y: Yes N: No NA: Not Applicable)

		Y	N	NA	Normal Situation	Remarks
	General					
1	What are the current site conditions?	--	--	--	--	
2	Are all applicable site records (e.g., documentation of construction activity, SMD system maintenance and repair, most current easement, etc.) complete and up to date?					
	Environmental Easement					
3	Has site use (commercial or industrial) remained the same?					
4	Does it appear that all environmental easement restrictions have been followed?					
	Composite Cover, Impermeable Cap & SMD System					
5	Are there any indications of a breach in the capping system at the time of this inspection?					
6	Are there any cracks in the building slabs?					
7	Are there any cracks in the building walls?					
8	Is there any construction activity, or indication of any construction activity within the past certification year (including any tenant improvements), that included breaching the capping system or altering the SMD system at the time of this inspection?					
9	If YES to number 8, is there documentation that the Site Management Plan, HASP, and CAMP for the site was/is being followed?					

*****If the answer to any of the above questions indicate non-compliance with any ICs/ECs for the site, additional remarks must be provided and, where applicable, documentation should be attached to this checklist detailing additional inspection and repair activities.*****

Additional remarks:

Minimum Inspection Schedule:

- At a minimum, site-wide inspections will be conducted annually, per certification year.
- Additional site-wide inspections will also be conducted immediately following severe storm/weather conditions.
- This checklist will be completed as part of each site-wide inspection event.

SMD SYSTEM INSPECTION CHECKLIST

Site Name: 1709 Surf Avenue Location: Brooklyn, New York Project Number: 170747001

Inspector Name: _____ Date: _____ Weather Conditions: _____

Reason for Inspection (i.e., routine, maintenance, severe condition, etc.): _____

Check one of the following: **Y:** Yes **N:** No **NA**: Not Applicable

		Y	N	NA	Normal Situation	Remarks
	Records					
1	Is the Site Management Plan readily available on-site?				Y	
2	Based on site records, when was the last inspection, maintenance, or repair event?					
3	Based on site records, was the system inoperational for any amount of time since the last inspection, maintenance, or repair event? For how long? Provide details.				N	
	Alarm System					
4	Do the alarm lights indicate that the system is operational?				Y	
	General System					
5	Is there any construction activity, or indication of any construction activity within the past certification year (including any tenant improvements), that included the breaching of the floor slab, on-site at the time of this inspection?				N	
6	If YES to number 5, is there documentation that the Soil Management Plan, HASP, and CAMP for the site was/is being followed?				NA if N to 5/ Y if Y to 5	
7	If YES to number 5, is there documentation that all breaches in the floor slab have been sealed?				NA if N to 5/ Y if Y to 5	
8	Does all visible SMD system piping appear intact and undamaged?				Y	
9	Have any intake points been constructed at the roof near (less than 10 feet) the SMD system blower discharge point?				N	

SMD SYSTEM INSPECTION CHECKLIST

Site Name: 1709 Surf Avenue Location: Brooklyn, New York Project Number: 170747001

Inspector Name: _____ Date: _____ Weather Conditions: _____

Reason for Inspection (i.e., routine, maintenance, severe condition, etc.): _____

Check one of the following: **Y:** Yes **N:** No **NA**: Not Applicable

		Y	N	NA	Normal Situation	Remarks
	SMD System Blower Unit					
10	Is the SMD system blower operational at the time of the inspection?				Y	
11	What is the VelociCalc Meter reading?					
12	Is the SMD system blower expelling air at the discharge point?				Y	
13	Have dust and debris been removed from surface of blower?				Y	
14	Have dirty or clogged filter cartridges been replaced?				Y	
15	Vacuum Monitoring Point Readings	**Reading**			**Sufficient?**	**Remarks**
	VMP-1					
	VMP-2					
	VMP-3					
	VMP-4					
	VMP-5					
	VMP-6					
	VMP-7					
	VMP-8					

*** If the answer to any of the above questions indicate the SMD system is non-operational or malfunctioning, or that this EC is in non-compliance,additional remarks must be provided and, where applicable, documentation attached to this checklist detailing additional inspection and repair activities.**

Additional remarks _____
_____
_____
_____
_____
_____
_____
_____

Minimum Inspection Schedule: SMD inspections will be conducted quarterly for the first certification year at a minimum. Additional inspections will also be conducted at times of maintenance, repair, or severe condition events. The minimum schedule will be revised, as necessary, following the first certification year. All inspection events will utilize this checklist.

Summary of Green Remediation Metrics for Site Management

Site Name: 1709 Surf Avenue Site Code: C224398

Address: 1709 Surf Avenue City: Brooklyn

State: NY Zip Code: 11224 County: Kings

Initial Report Period (Start Date of period covered by the Initial Report submittal)

Start Date: _____

Current Reporting Period

Reporting Period From: _____ To: _____

Contact Information

Preparer's Name: _____ Phone No.: _____

Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		

Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 5.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 5.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 5. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	**Total to Date (gallons)**
Total quantity of water used on-site		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 5.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	**Total to Date (acres)**
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 5.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Other:

APPENDIX J

HEALTH AND SAFETY PLAN

SITE MANAGEMENT PLAN
HEALTH AND SAFETY PLAN

FOR

1709 SURF AVENUE
BROOKLYN, NEW YORK
Brooklyn Borough Tax Map
Block 7061, Lots 16, 20, 21, 27, and part of Lot 14

Prepared for

Coney Island Associates Phase 3 LLC
c/o BFC Partners
150 Myrtle Avenue, Suite 2
Brooklyn, New York 11201

Prepared by:

Langan Engineering, Environmental, Surveying
Landscape Architecture and Geology
368 Ninth Avenue, 8th Floor
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California • Texas • Arizona • Utah • Colorado • Washington • Tennessee • Florida | Athens • Calgary • Dubai • London • Panama

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***** Items to be posted prominently on-site or made readily available to personnel.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) HEALTH AND SAFETY PLAN (HASP) was developed to address disturbance of known and reasonably anticipated subsurface contaminants and comply with Occupational Safety and Health Administration (OSHA) Standard 29 Code of Federal Regulation (CFR) 1910.120(b)(4), Hazardous Waste Operations and Emergency Response during anticipated site work for the property located at 1709 Surf Avenue in the Coney Island neighborhood of Brooklyn, New York (the Site). The site is defined by Block 7061, Lots 16, 20, 21, 27, and a portion of Lot 14 on the Kings County Tax Map.

This HASP provides the minimum requirements for implementing site operations during future remedial measures. All contractors performing work on this site must implement their own HASP that, at a minimum, adheres to this HASP. The contractor is responsible for their own health and safety and that of their subcontractors. Langan personnel will implement this HASP while onsite.

The content of this HASP may change or undergo revision based upon additional information made available to health and safety personnel, monitoring results, or changes in the work plan.

1.2 Site Location and Background

The about 65,800 square-foot (1.5 acre) site is located at 1709 Surf Avenue in the Coney Island neighborhood of Brooklyn, New York and is identified on the Kings County Tax Map as Tax Block 7061, Lots 16, 20, 21, 27 and a portion of Lot 14. Block 7061 is bordered by Mermaid Avenue to the north, West 17th Street to the east, Surf Avenue to the south, and West 19th Street to the west. Surrounding property uses include residential and commercial use buildings, institutional buildings, vacant land and park land. A site location map is attached as Figure 1.

The site has historically been used for various residential, institutional, and commercial purposes including a railroad (1895 to 1950) on Lot 14, a hotel (1895) on Lots 16, 20 and 21, a school (1906) on Lot 16, an unspecified store (1906 to 1950) and a drycleaner (1965 to 2007) on Lot 20, unspecified stores on Lot 21 (1906 to 1989), and a gasoline filling station with petroleum bulk storage and auto service station (1968 to 2003) and a car wash (1991 to 2003) on Lot 27. By 2004, Lots 16, 20, 21, and 27 were vacated and Lot 14 was improved with a parking lot.

Lot 27, which was historically used as a filling station and auto repair facility, is associated with NYSDEC Spill No. 0302857, reported on June 17, 2003, after petroleum-impacts were identified

in soil and groundwater during the excavation and removal of twenty underground storage tanks (USTs) associated with the former gasoline filling station. These USTs are registered under NYSDEC Petroleum Bulk Storage (PBS) No. 2-350486 and were removed on June 1, 2003. Impacted soil and free product were removed during excavation.

1.3 Summary of Work Tasks

1.3.1 Geophysical Investigation - Underground Utility Clearance Policy

While not anticipated, prior to the commencement of any intrusive field activities (i.e., all soil borings, test pits, or excavations into the engineering control); Langan field engineers will follow the Langan Underground Utility Clearance Policy (Attachment A) including the retaining one or more geophysical consultants, if required, to conduct geophysical surveys using ground penetrating radar (GPR) and electromagnetic detection equipment.

The objective of a geophysical survey is to identify any underground storage tank (UST) structures, drains, underground utilities, and other subsurface anomalies that may be encountered during an intrusive investigation. Langan personnel will observe the geophysical survey of each location and confirm the locations are both accessible and free of potential utility or other known or suspected subsurface structures. There will be no exemption to this section unless granted by written approval by the Principal in Charge (PIC).

1.3.2 "Soft-Dig" Clearance of Borehole Locations

In accordance with Langan's Underground Utility Clearance Policy, Langan will instruct the drilling or excavation contractor to "Soft-Dig" each target soil boring, test pit, or excavation location as specified in Section 1.3.1. Soft dig is defined as using a vacuum system (with or without an air knife) or hand auger to clear soil from the proposed soil boring location to a depth of 5-feet. When excavating a test pit or larger excavation, the exaction contractor will "peal" away thin layers of soil with their excavator or shovel to daylight potential underground structures until achieving the required 5-feet depth. If using an excavator, the contractor must have a worker observing the excavator bucket/shovel warning the excavator operator when the bucket/shovel encounters a possible underground structure. At which point, the potential structure must be hand shoveled until it is fully daylighted. Langan personnel will confirm that the "soft dig" activities are completed to these specifications.

1.3.3 Day Lighting Excavation and Soil Screening

Langan may retain one or more excavation contractors to daylight buried unidentified structures.

The purpose of the daylighting is to confirm if these structures are subsurface structures of concern including USTs, utilities sewer lines, storm water drains, electrical, gas or other utility line as well as other artifacts pertinent to the work plan. The excavation contractors will contact the appropriate utility mark-out authority and make available to their staff the verification number and effective dates.

The excavation contractor will employ "soft dig" methods as defined in Section 1.3.2. Langan may screen excavated soil for visual, olfactory, and instrumental indicators suggestive of a potential chemical or petroleum release. Instrument screening for the presence of volatile organic compounds (VOC) may be performed with a duly calibrated photoionization detector (PID). Contractors will notify Langan personnel if they identify indications suggestive of a potential chemical or petroleum release. Contaminated material shall be handled, and property disposed in accordance with federal, state and city regulations, criteria, and guidelines.

1.3.4 Annual Inspection of Engineering Controls

On an annual basis or at shorter interims, Langan will conduct an inspection of the engineering controls implement during remediation phase. Inspections objectives and the data to be collected is included in the SMP.

1.3.5 Startup and Operation of a Sub-Membrane Depressurization (SMD) System

If required, Langan will document the startup of the sub membrane depressurization remedial system (SMD). As part of startup, Langan may observe the contractor installation and adjusting of the SMD system. When performing maintenance or adjustments of the SMD system, Langan will follow specification and procedures specified in the Operations and Maintenance (O&M) Plan.

1.3.6 Sub-Membrane Depressurization (SMD) System Monitoring

Monitoring of the SMD system will be performed per the SMP to evaluate whether the system is operating within design parameters. A visual inspection of the system will be conducted during each monitoring event. Unscheduled inspections and/or sampling may take place when a suspected failure of the SMD system has been reported or an emergency occurs that is deemed likely to affect the operation of the system.

1.3.7 Site-Wide Inspection

Site-wide inspections will be performed at a minimum of once per year or as specified in the SMP. These periodic inspections must be conducted when the ground surface is visible (i.e. no

snow cover). Site-wide inspections will be performed by a qualified environmental professional. Site-wide inspections may also be performed after severe weather conditions that may affect Institutional and Engineering Controls (IC and EC) or monitoring devices. Inspection will be conducted in accordance with specifications outlined in the work plan or SMP.

1.3.8 Soil Investigation and Sampling

Langan may retain a drilling contractor to advance soil borings to a depth below grade surface (bgs) specified in the work plan. Borings will be installed at the approximate locations indicated in Langan's work plan but may be moved in the field based on utility clearance and accessibility. The drilling contractor will contact the appropriate utility mark-out authority and make available to their drilling staff the verification number and effective dates. Langan will record the verification number and effective dates from the drillers. Langan will also note the location of marked out utilities on the site plan and scan the data into the project folder.

Langan personnel will screen soil for visual, olfactory, and instrumental indicators suggestive of a potential petroleum release. Instrument screening for the presence of VOC may be performed with a duly field calibrated PID (or equivalent). Langan personnel will collect soil samples from the proposed soil boring locations following the sampling plan outlined in the work plan. The borings will be filled with clean soil cuttings, clean sand or bentonite grout and capped at grade to match the surrounding surface after samples are collected.

Soil samples will be submitted to a specific lab per the work plan or to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory and analyzed in accordance with work plan specifications.

1.3.9 Groundwater Investigation and Sampling

Langan may complete a supplemental groundwater investigation. Langan may sample existing monitoring wells or during a subsequent soil investigation convert selected soil borings into groundwater monitoring wells. Groundwater samples will be collected from one or more of the new and if available, pre-existing monitoring wells in accordance with the Langan Low Flow Groundwater Sampling SOP (SOP #12). Groundwater samples will be submitted to an approved laboratory and analyzed for constituents as specified in the work plan. Temporary monitoring wells will be plugged and abandoned during the investigation in the manner defined in Section 1.3.2 for soil boring. Permanent monitoring wells will be completed with a road box set in concrete. Permanent monitoring wells will be eventually backfilled and abandoned in accordance with State and Local regulations.

Groundwater samples will be submitted to a NYSDOH ELAP-certified laboratory and analyzed in accordance with work plan specifications.

1.3.10 Groundwater/Product Gauging

Langan may gauge one or more of the observation/monitoring wells to collect synoptic head data or determine the presence of product. When gauging, Langan may also survey head space VOCs within the well using a duly calibrated PID. When collected, gauging data will be based on the northernmost point at top of casing (TOC) using an interface probe (IP) capable of determining the presence of free product in the monitoring well as light non-aqueous phase liquid (LNAPL) at the top of the water column. If gauging for dense non-aqueous phase liquid (DNAPL) at the base of the monitoring well, the IP may not be appropriate. The field engineer will coordinate with the project team to devise an alternative method to gauge the thickness of DNAPL at base of the well. Langan will decontaminate gauging equipment between wells as required by the work plan.

1.3.11 Product Bailing

Langan may contract a 3rd part to remove free product (coal tar) from on-site monitoring wells as part of this HASP during SMP activities. The contractor will use a dedicated stainless-steel bailer or similar device, peristaltic pump or submersible as determined by their work plan and approved by Langan. Langan will record the volume of product and groundwater recovered. Recovered product and groundwater will be drummed and handle in accordance with procedures outlined in the work plan.

1.3.12 Sub Slab or Soil Vapor Point Installation and Sampling

Langan (or its contractor) may install one or more sub-slab or soil vapor points at selected locations. If installed, the sub-slab points will be set at or just below the bottom of the slab in accordance with the work plan. The sub-slab points may be installed using an electric hammer drill to advance small diameter borings through the concrete (or equivalent) slab as defined in the work plan. The borings will terminate in and sample from the gravel substrate below the slab. Conditions in the field may require adjustment of sampling locations.

Langan personnel (or contractor) may install VaporPin® vapor points (or equivalent) in accordance with the manufacturer's instructions. If no point is used, Langan (or contractor) will set a sampling tube defined as an open-ended Teflon™-lined polyethylene tubing (or equivalent tubing as approved by the project manager [PM]). The sampling tube will be set either within the base of the concrete slab or within the support gravel underlying the slab.

When using the VaporPin® or equivalent, the installation sleeve will provide the necessary annulus seal required for subsequent sampling. However, if a sampling tube as defined above is use, the annulus at the top of the concrete slab will be filled with bentonite or food grade clay to seal the slab. A sand pack is not required for sub-slab vapor sampling. Unless specified by the work plan, the sub slab points are temporary and will be pulled after the sampling event and the hole will be patched at grade with material similar to the surrounding surface.

Langan personnel will confirm that the soil vapor points (implants) are 2-inches in length constructed of polyethylene material and are connected to the surface by Teflon™-line polyethylene material (equivalent materials for the point and tubing are acceptable as approved by the PM). The annulus around the implant will be filled with clean sand to 6-inches above the implant. A 1-foot bentonite slurry will be applied to the top of the sand up to seal the sampling points. The remaining soil vapor point annulus may be backfilled with clean cuttings are sand to grade. Unless specified by the work plan, the vapor points are temporary and will be pulled after the sampling event and the hole will be patched at grade with material similar to the surrounding surface.

Vapor samples will be collected in accordance with following guidance including Final Guidance for Evaluating Soil Vapor Intrusion published by the New York State Department of Health (NYSDOH) in October 2006, Langan's Sub-Slab Vapor Sampling SOP (SOP #14) and as specified in the work plan. In addition, ambient air and indoor air samples may be collected for use as a comparison sample. As part of the indoor air sampling program, Langan personnel may complete a building inventory inspection. The inspection may take place prior to the commencement of actual field sampling. Vapor samples may be submitted to a NYSDOH ELAP-certified laboratory and analyzed in accordance with work plan specifications.

1.3.13 Observation/Monitoring Well Plugging and Abandonment

While not scheduled, existing observation/monitoring wells may be plugged or abandoned as specified in the work plan. Plugging and abandonment will be in accordance with federal and state requirements. Langan may retain a drilling contractor to complete the plugging and abandonment activities. The contractor will contact the appropriate utility mark-out authority and make available to their field staff the verification number and effective dates. Langan may observe the plugging and abandonment of one or more observation/monitoring wells to document that the plugging and abandonment activities were completed in accordance with the work plan and regulations.

1.3.14 QA/QC Sampling

Samples for quality assurance/quality control [QA/QC] may also be collected and submitted to an approved laboratory and analyzed in accordance with work plan specifications. Information regarding the QA/QC samples including required method of analysis may be included in the same COC as the soil samples unless otherwise instructed by the work plan.

1.3.15 Equipment Decontamination

Before the start of the day's sampling and after sampling each run, sampling equipment will be decontaminated by the decontamination process outlined Attachment B - Decontamination Procedures. Decontamination wastes and purge water will be temporarily stored on site pending analytical results.

1.3.16 Management of Investigative-Derived Waste

The investigative-derived waste (IDW) generated during this investigation will be contained in DOT-approved 55-gallon drums. The drums will be temporarily stored on the site or as directed by the client representative. All drums will be filled between to two-thirds full to allow easy maneuvering during drum pickup and disposal. Drum labels are to be provided by Langan (Environmental Closet). All drums will be labeled as "IDW Pending Analysis" until sample data are reported from the laboratory. Drum labels will include date filled and locations where waste was generated along with the standard information required by the labels in accordance with the Langan SOP09, Drum Labeling.

Closed top drums are to be used to store liquids. Debris, including plastic sheeting, polyethylene tubing, personal protection equipment (PPE), decontamination debris, etc. will be segregated from and disposed in large heavy duty garbage bags and disposed of at the site. Excess unused glassware should be returned to the lab along with the last day of collection samples.

1.3.17 Drum Sampling

Langan personnel may collect drum samples, as required, prior to off-site drum disposal. Samples will be placed into laboratory-supplied batch-certified clean glassware and submitted to an approved laboratory and analyzed in accordance with work plan specifications, if required.

1.3.18 Surveying

Surveying activities may be completed by Langan. The surveying will be conducted by appropriately licensed surveyors.

2.0 IDENTIFICATION OF KEY PERSONNEL/HEALTH AND SAFETY PERSONNEL

The following briefly describes the health and safety (H&S) designations and general responsibilities that may be employed for this site. The titles have been established to accommodate the project needs and requirements and ensure the safe conduct of site activities. The H&S personnel requirements for a given work location are based on the proposed site activities.

2.1 Langan Project Manager

The Langan Environmental Project Manager (PM) is Meghan Aronica, her responsibilities include:

- Ensuring that this HASP is developed, current, and approved prior to on-site activities.
- Ensuring that the tasks in the project are performed in a manner consistent with Langan's comprehensive *Health and Safety Program for Hazardous Waste Operations* and this HASP.

2.2 Langan Corporate Construction Health and Safety Manager

The Langan Corporate Construction Health and Safety Manager is Tony Moffa. His responsibilities include:

- Updating the *Health and Safety Program for Hazardous Waste Operations*.
- Assisting the site Construction Health and Safety Officer (HSO) with the development of the HASP, updating HASP as dictated by changing conditions, job site inspection results, etc., and approving changes to this HASP.
- Assisting the HSO in the implementation of this HASP and conducting Jobsite Safety Inspections and assisting with communication of results and correction of shortcomings found.
- Maintaining records on personnel (medical evaluation results, training and certifications, accident investigation results, etc.).

2.3 Langan Site Health & Safety Officer

The Langan site HSO is William Bohrer. His responsibilities include:

- Participating in the development and implementation of this HASP.
- When on-site, assisting the Langan Field Team Leader in conducting Tailgate Safety Meetings and Jobsite Safety Inspections and correcting any shortcomings in a timely manner.

- Ensuring that proper PPE is available, worn by employees, and properly stored and maintained.
- Controlling entry into and exit from the site contaminated areas or zones.
- Monitoring employees for signs of stress, such as heat stress, fatigue, and cold exposure.
- Monitoring site hazards and conditions.
- Knowing (and ensuring that all site personnel also know) emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department.
- Resolving conflicts that may arise concerning safety requirements and working conditions.
- Reporting all incidents, injuries, and near misses to the Langan Incident/Injury Hotline immediately and the client representative.

2.4 Langan Field Team Leader Responsibilities

The Langan Field Team Leader (FTL) is to be determined prior to the start of field activities. The Field Team Leader's responsibilities include:

- The management of the day-to-day site activities and implementation of this HASP in the field.
- Participating in and/or conducting Tailgate Safety Meetings and Jobsite Safety Inspections and correcting any shortcomings in a timely manner.
- When a Community Air Monitoring Operating Program (CAMP) is part of the scope, the FTL will set up and maintain community air monitoring activities and instruct the responsible contractor to implement organic vapor or dust mitigation when necessary.

2.5 Contractor Responsibilities

2.5 Contractor Responsibilities

The contractor must develop and implement their own HASP for their employees, their subcontractors, and consultants. The contractor is responsible for their own health and safety and that of their subcontractors. Contractors operating on the site must designate their own FTL, HSO, and Health and Safety Manager (HSM). The contractor's HASP will be at least as stringent as this HASP. The contractor must be familiar with and abide by the requirements outlined in their own HASP. A contractor may elect to adopt Langan's HASP as its own if it has given written notification to Langan, but where Langan's HASP excludes provisions pertinent to the contractor's work (i.e., confined space entry); the contractor must provide written addendums to this HASP. Additionally, the contractor must:

- Ensure their employees are trained in the use of all appropriate PPE for the tasks involved.
- Notify Langan of any hazardous material brought onto the job site or site-related area, the hazards associated with the material and must provide a safety data sheet (SDS) for the material.
- Have knowledge of, understand, and abide by all current federal, state, and local health and safety regulations pertaining to the work.
- Ensure their employees handling hazardous materials, if identified at the Site, have received current training in the appropriate levels of 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response* (HAZWOPER) if hazardous waste is identified at the Site,
- Ensure their employees handling hazardous materials, if identified at the Site, have been fit-tested within the year on the type of respirator they will wear.
- Ensure all air monitoring is in place pertaining to the health and safety of their employees as required by OSHA 1910.120; and
- All contractors must adhere to all federal, state, and local regulatory requirements.

3.0 TASK/OPERATION SAFETY AND HEALTH RISK ANALYSES

A Task-Hazard Analysis (Table 1) was completed for general hazards that may be encountered at the Site. The potential contaminants that might be encountered during the field activities and the exposure limits are listed in Table 2. The Safety Data Sheets for each potential contaminant listed in Table 2 is included in Attachment E.

3.1 Specific Task Safety Analysis

3.1.1 Geophysical Survey

Langan personnel are not permitted to operate or otherwise handle the geophysical equipment including GPR/electromagnetic detection equipment used for surface utility clearance or downhole geophysical equipment used to survey boreholes. When conducting surface utility clearance surveys, the locations of the borings, test pits, and other excavations must be fully marked out. In addition, possible detections by the utility clearance contractor of utilities and other artifacts must also be marked-out. Markings should include paint, flags, or color tape (when marking indoor locations that the client has specifically requested not be marked with paint). This information must also be added to the site map.

3.1.2 "Soft Dig" Clearance of Borehole Locations

"Soft-Dig" clearance will be completed by the contractors. Langan personnel are not permitted

to operate or otherwise handle the contractor's equipment. Langan will update the site map to include the locations of the cleared borehole locations as well as utilities and other artifacts that may interfere with the subsurface investigation.

3.1.3 Daylighting Test Pit

Excavation daylighting must abide by OSHA excavation standards (Part 1926.651) and conform to the Langan Underground Utility Clearance Policy. Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence.

No one is to enter an excavation deeper than 5-feet unless the excavation walls are properly sloped in accordance with OSHA regulations. If sampling is required, the sample for excavations deeper than 5-feet without protective systems (sloping) as defined by OSHA are to be collect using suitable mechanical excavation equipment (backhoe or equivalent). When collecting soil samples, Langan will don chemical resistant gloves in addition to the standard PPE. Langan personnel are not to operate excavation equipment. This task is to be completed by an authorized excavation contractors approved by the contractor.

3.1.4 Indoor Drilling and Excavation

The work scope may require indoor excavation where there may not be adequate ventilation sufficient to safely operate any rig or excavation equipment powered by an internal combustion engine. Where possible, all such work should be done by equipment powered by electricity. If such equipment is used and must be directly wired to the buildings electrical system or to an independent system, this work must be completed by a licensed electrician in accordance with all electrical codes applicable to the work.

Indoor work which is to be completed with equipment powered by an internal combustion engine must incorporate air monitoring for carbon monoxide (CO) using calibrated air monitoring equipment (MultiRAE or equivalent). In addition, the work plan should incorporate mitigation for venting engine exhaust fumes directly to the outdoors and for circulating fresh air into the work area.

The OSHA Time Weighted Average (TWA) Permissible Exposure Limit (PEL) for CO from 50 to 35 parts per million (ppm). Langan will monitor CO with a suitable monitoring device. If CO

levels exceed 5 ppm, Langan will instruct contractors to begin mitigation measures. These measures are at a minimum:

- Increase air circulation using industrial size fans to bring additional fresh air into the building or vent exhaust to the outside.
- Modify the passive exhaust method being used to increase venting circulation by using wider diameter tubing or sealing tubing connections; or
- Modify the work schedule where the rig is turned off to allow time for CO levels to fall back to background.

All work must cease if CO levels reach 35 ppm. The Langan engineer is to report to the PM and H&S officer when an action level is reached.

3.1.5 Site-Wide Inspection

Langan will conduct site-wide inspections as specified in the SMP. Langan personnel will don all required PPE and maintain awareness to site traffic and site activities. If using a cell phone or tablet application to record the pertinent data, the engineer will do so in an area protected from site traffic and activities. Seasonal precautions should be implemented including insect repellent and sunscreen during warm weather and appropriate protective clothing for warm and cold weather outdoor work.

3.1.6 SMD System Startup and Operations and Maintenance

Startup and system operation and maintenance (O&M) may require the isolation and inerting of electrical, mechanical, or pressurized/vacuum components of the SMD system. Langan will follow appropriate lockout/tagout protocols as specified in this HASP and where required by the O&M manual.

The SMD system Vacuum/Pressure Regenerative Blowers are slated to be installed on the building's roof. As such, Langan personnel assigned to inspect or provide O&M to the blowers or to sample from the blower discharge outlets must have fall protection awareness training.

3.1.7 SMD System Inspection

When performing periodic SMD inspections, Langan personnel will don all required PPE and maintain awareness to site traffic and site activities. If using a cell phone or tablet application to record the pertinent data, the engineer will do so in an area protected from site traffic and activities. Certain types of inspections may require additional PPE and safety training including fall protection and open water hazards.

3.1.8 Annual Engineering Control Inspection

Langan personnel will conduct inspections and observe repairs to the Engineering Controls installed as the site at part of the remedy. Inspect work will be conducted in accordance with specification in the SMP. Repairs will be conducted in accordance with work plans drawn to address the repairs. Langan may record the data the work plan requires. All future repair work to the engineering controls will be done exclusively by the contractor following their own health and safety specifications outlined in their HASPs. Other activities assigned to Langan as part of work activities are limited to inspection and observations as specified in the SMP or future work pans. Langan personnel are not to operate or assist in the operation of equipment used in construction activities unless defined as part of an inspection or observation in the work plan.

3.1.9 Soil Investigation and Sampling

Sampling the soil requires the donning of chemical resistant gloves in addition to the standard PPE. Langan personnel are not to operate drilling or excavation equipment nor open sampling devices (acetate liners, sonic sample bags, etc.). These tasks are to be completed by the driller or excavation contractor.

3.1.10 Groundwater Investigation and Sampling

Sampling groundwater requires the donning of chemical resistant gloves in addition to the standard PPE and cut resistant gloves when cutting sampling-tubing to length. Langan personnel are not to operate drilling equipment nor assemble or install monitoring well equipment. These tasks are to be completed by the driller contractor.

1.3.11 Groundwater/Product Gauging

Gauging product requires additional safety considerations including the presence of VOCs and protection of both field cloths and property. Langan will monitor air for VOCs using a duly calibrated PID. Langan will don protective clothing including Tyvek® over-cloths, as necessary. To protect property, Langan will work set a plastic barrier to protect floors or protect landscaping and use absorbent pads as necessary to collect pooled product. If sampling for PFAS from the same well, Langan will complete the product check first, if the well can be sampled without including product, Langan will remove the Tyvek® material from the well head vicinity.

3.1.12 Product Recovery Well Bailing

Langan may bail free product from monitoring wells. Free product bailing requires the donning

of Tyvek™ suits, Tyvek™ boots and chemical resistant gloves in addition to the standard PPE and cut resistant gloves when cutting sampling-tubing to length. In addition, Langan will place plastic sheeting around the recovery well head to control spillage during product recovery. Langan will also keep on hand and readily available product absorbing pads to use as needed.

3.1.13 Electrical Pumps

Langan may use an electric pump to collect product from the recovery wells or to sample groundwater. Langan will inspect the electric pump and control box prior to use and specifically note the condition of the electrical connectors, pump, control box and the electrical cord. The electrical connection must be a grounded and connect to the power source using a functional three prong grounded plug. The power source must be a Ground Fault Circuit Interrupter (GFI or GFCI) receptacle.

3.1.14 Vapor Investigation and Sampling

Sampling vapor requires the donning of work gloves in addition to the standard PPE when assembling the Summa™ canister with the regulator and cut resistant gloves when cutting sampling- or silicone-tubing to length. Langan personnel are not to operate contractor equipment nor assemble or install the contractor vapor point sampling equipment unless instructed by the work plan. When not instructed by the work plan, these tasks are to be completed by the contractor.

3.1.15 Additional Vapor Screening

Langan personnel may prescreen vapor samples for volatile organic compounds (VOCs), methane, hydrogen sulfide and lower explosion limit (LEL) conditions using duly calibrated devices design to screen vapor for these parameters. Langan personnel may also perform atmospheric screening for LEL. Results of the screening may be used in determining which soil vapor samples will be submitted for analysis.

Work activities will immediately cease, and the work area is to be evacuated if the MultiRAE returns a reading of 10% of the LEL (an alarm will sound). Langan personnel will contact the Langan PM. Instrument action levels for monitored gases are provided in Table 4.

3.1.16 Plugging and Abandonment of Observation/Monitoring Wells

Langan personnel are not to operate equipment nor assist in the plugging and abandonment of the observation/monitoring wells. These tasks are to be completed by the contractor.

3.1.17 Drum Sampling

Drilling fluid, rinse water, grossly contaminated soil samples, and cuttings will be containerized in 55-gallon drums for disposal off-site. Each drum must be labeled in accordance with the Langan Drum Labeling Standard Operating Procedure (SOP09). Sampling drums requires the donning of work gloves when opening the drums and chemical resistant gloves when sampling in addition to standard PPE.

Langan personnel and contractors are not to move or open any orphaned (unlabeled) drum found on the site without approval of the project manager.

3.2 Radiation Hazards

No radiation hazards are known or expected at the site.

3.3 Physical Hazards

Physical hazards, which may be encountered during site operations for this project, are detailed in Table 1.

3.3.1 Explosion

No explosion hazards are expected for the scope of work at this site.

3.3.2 Heat Stress

The use of Level C protective equipment, or greater, may create heat stress. Monitoring of personnel wearing personal protective clothing should commence when the ambient temperature is 72^{O}F or above. Table 6 presents the suggested frequency for such monitoring. Monitoring frequency should increase as ambient temperature increases or as slow recovery rates are observed. Refer to Table 7 to assist in assessing when the risk for heat-related illness is likely. To use this table, the ambient temperature and relative humidity must be obtained (a regional weather report should suffice). Heat stress monitoring should be performed by the HSO or the FTL, who must be able to recognize symptoms related to heat stress.

To monitor the workers, be familiar with the following heat-related disorders and their symptoms:

- **Heat Cramps:** Painful spasms of arm, leg, or abdominal muscles, during or after work
- **Heat Exhaustion:** Headache, nausea, dizziness; cool, clammy, moist skin; heavy sweating; weak, fast pulse; shallow respiration, normal temperature

- **Heat Stroke**: Headache, nausea, weakness, hot dry skin, fever, rapid strong pulse, rapid deep respirations, loss of consciousness, convulsions, coma. *This is a life-threatening condition***.**

Do not permit a worker to wear a semi-permeable or impermeable garment when they are showing signs or symptoms of heat-related illness.

To monitor the worker, measure:

- **Heart rate:** Count the radial pulse during a 30-second period as early as possible in the rest period. If the heart rate exceeds 100 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same. If the heart rate still exceeds 100 beats per minute at the next rest period, shorten the following work cycle by one-third. A worker cannot return to work after a rest period until their heart rate is below 100 beats per minute.
- **Oral temperature:** Use a clinical thermometer (3 minutes under the tongue) or a similar device to measure the oral temperature at the end of the work period (before drinking). If oral temperature exceeds 99.6^{o}F (37.6^{o}C), shorten the next work cycle by one-third without changing the rest period. A worker cannot return to work after a rest period until their oral temperature is below 99.6^{o}F. If oral temperature still exceeds 99.6^{o}F (37.6^{o}C) at the beginning of the next rest period, shorten the following cycle by one-third. Do not permit a worker to wear a semi-permeable or impermeable garment when oral temperature exceeds 100.6^{o}F (38.1^{o}C).

Prevention of Heat Stress - Proper training and preventative measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat-related illnesses. To avoid heat-stress the following steps should be taken:

- Adjust work schedules.
- Mandate work slowdowns as needed.
- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must equal the amount of water lost in sweat, i.e., eight fluid ounces (0.23 liters) of water must be ingested for every eight ounces (0.23 kilograms [kg]) of weight lost. The normal thirst mechanism is

not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:

- Maintain water temperature 50^{O} to 60^{O}F (10^{O} to 16.6^{O}C).
- Provide small disposal cups that hold about four ounces (0.1 liters).
- Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
- Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
- Train workers to recognize the symptoms of heat-related illness.

3.3.3 Cold-Related Illness

If work on this project begins in the winter months, thermal injury due to cold exposure can become a problem for field personnel. Systemic cold exposure is referred to as hypothermia. Local cold exposure is called frostbite.

- **Hypothermia -** Hypothermia is defined as a decrease in the patient core temperature below 96^{O}F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interference with any of these mechanisms can result in hypothermia, even in the absence of what normally is considered a "cold" ambient temperature. Symptoms of hypothermia include shivering, apathy, listlessness, sleepiness, and unconsciousness.
- **Frostbite -** Frostbite is both a general and medical term given to areas of local cold injury. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20^{O}F. Symptoms of frostbite are a sudden blanching or whitening of the skin; the skin has a waxy or white appearance and is firm to the touch; tissues are cold, pale, and solid.

Prevention of Cold-Related Illness - To prevent cold-related illness:

- Educate workers to recognize the symptoms of frostbite and hypothermia.
- Identify and limit known risk factors:
- Assure the availability of an enclosed, heated environment on or adjacent to the site.
- Assure the availability of dry changes of clothing.
- Assure the availability of warm drinks.
- Start (oral) temperature recording at the job site:

- At the FSO or Field Team Leader's discretion when suspicion is based on changes in a worker's performance or mental status.
- At a worker's request.
- As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20^{O}F, or wind-chill less than 30^{O}F with precipitation).
- As a screening measure whenever anyone worker on the site develops hypothermia.

Any person developing moderate hypothermia (a core temperature of 92^{O}F) cannot return to work for 48 hours.

3.3.4 Noise

Work during the proposed activities may be conducted at locations with high noise levels from the operation of equipment. Hearing protection will be used, as necessary.

3.3.5 Hand and Power Tools

The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut, or struck by the tool, fire, and electrocution. All hand and power tools should be inspected for health and safety hazards prior to use. If deemed unserviceable/un-operable, notify the supervisor and tag and remove equipment out of service. Ground Fault Circuit Interrupters (GFCIs) are required for all power tools requiring direct electrical service.

3.3.6 Slips, Trips, and Fall Hazards

Care should be exercised when walking at the site, especially when carrying equipment. The presence of surface debris, uneven surfaces, pits, facility equipment, and soil piles contribute to tripping hazards and fall hazards. To the extent possible, all hazards should be identified and marked on the site, with hazards communicated to all workers in the area.

3.3.7 Utilities (Electrocution and Fire Hazards)

3.3.7.1 Utility Clearance

The possibility of encountering underground utilities poses fire, explosion, and electrocution hazards. All excavation work will be preceded by a review of available utility drawings and by notification of the subsurface work to N.Y. One –Call–Center.

3.3.7.2 Lockout-Tagout

The potential adverse effects of electrical hazards include burns, arc flashes, and electrocution, which could result in serious injury including death. Therefore, there is a procedure that establishes the requirements for the lockout/tag out (LOTO) of energy isolating devices in accordance with the OSHA electrical lockout and tagging requirements as specified in 29CFR1910.147 and 29 CFR 1926.417. This procedure will be used to ensure that all machines and equipment are isolated from potentially hazardous energy. If possible, equipment that could cause injury due to unexpected energizing, start-up, or release of stored energy will be locked/tagged, before field personnel performs work activities.

The facility owner/operator/representative is to be the authorized person that will initiate and perform the LOTO in accordance with applicable rules and practices. Inerting of electrical power sources is to be completed by an authorized and licensed electrician. Langan personnel will follow LOTO protocols and practices including adding a separate lock/signature to the LOTO chain in accordance with said protocols and practices.

SPECIAL NOTE: Project personnel will assume that all electrical equipment at the surface, subsurface, and overhead locations are energized until equipment has been designated and confirmed as de-energized by a utility company representative. Langan will notify the designated utility representative prior to working adjacent to this equipment and will verify that the equipment is energized or de-energized in the vicinity of the work location. No project work shall be performed by Langan personnel or subcontractors near energized electrical lines or equipment.

The FTL shall accompany the designated facility owner/operator/representative or authorized/licensed electrician in surveying to locate and identify all energy-isolating devices. Langan will note which switches, valves or other isolating devices are used for inerting the equipment and how they are set assuring LOTO. The lockout/tagout procedure involves, but is not limited to, electricity, motors, steam, natural gas, compressed air, hydraulic systems, digesters, sewers, etc.

3.3.8 Adequate Lighting

Indoor or night activities must be done under adequate lighting conditions. The Langan field engineer must be able to clearly see the equipment, all controls and have sufficient lighting to detail color labels. Battery operated lights are sufficient provided they cast a wide enough field to provide the required lighting and there are back-up batteries and emergency flashlights available. Electrically powered lights are suitable provided the electrical source is equipped with a ground fault interrupt circuit (GFIC) and the extensions cords are visually inspected prior to each

use, and not used if they show cracked, damaged, or missing insulation. If a generator is supplying the electricity, it must be located outdoors and properly grounded and vented.

3.3.9 Physical Hazard Considerations for Material Handling

There are moderate to severe risks associated with moving heavy objects at the Site. The best method of reducing back injuries is to reduce or eliminate manual lifting. Mechanical lifting devices should be used whenever possible.

- Size up the load before attempting to lift it. Heavy objects will be lifted and moved by mechanical devices rather than manual effort whenever possible. Never overexert when lifting.
    - When using a mechanical device, the devices should be appropriate for the lifting of moving tasks and operated only by trained and authorized personnel.
    - Objects that require special handling or rigging will only be moved under the guidance of a person who has been specifically trained to move such objects.
    - Lifting devices will be inspected, certified, and labeled to confirm their weight capacities. Defective equipment will be taken out of service immediately and repaired or destroyed.
    - The wheels of any trucks being loaded or unloaded will be choked to prevent movement. Outriggers will be fully extended on a flat, firm surface during operation.
    - Personnel will not pass under a raised load, nor will a suspended load be left unattended.
    - Personnel will not be carried on lifting equipment unless it is specifically designed to carry passengers.
    - All reciprocating, rotating, or other moving parts will be guarded at all times.
    - Accessible fire extinguishers, currently (monthly) inspected, will be available in all mechanical lifting devices.
    - Verify all loads/materials are secure before transportation
- If manual lifting cannot be avoided the following lifting procedures are recommended.
    - If the load is thought to be more than one person can handle, get another person to help with the job.
    - Make sure you can carry the load where you need to go before attempting to lift it. Make sure your path is clear of equipment, materials, debris, holes, etc.
    - Place your feet close to the object, spread about 12 inches apart.
    - Bend your knees and get a good hand hold.
    - Lift straight up smoothly, allowing your legs not your back to do the work.
    - Keep the load close to the body with your elbows and arms tucked in.
    - Do not twist or turn your body once you have made the lift.
    - Set the load down properly:
        - Lower the load slowly by bending at your knees, letting your legs do most

of the work.
- Don't let go of the load until it's secure on the surface.

Material handling tasks that are unusual or require specific guidance will need a written addendum to this HASP. The addendum must identify the lifting protocols before the tasks are performed. Upon approval, the plan must be reviewed with all affected employees and documented. Any deviation from a written plan will require approval by the Langan HSM.

3.3.10 Hearing Conservation

Under the construction industry standard, the maximum permissible occupational noise exposure is 90 A-weighted decibels (dbA) (8-hour TWA), and noise levels in excess of 90 dbA must be reduced through feasible administrative and engineering controls (20 CFR 1926.52). Hearing protection is required when working within 15 feet of vacuum extraction equipment and drill rigs.

3.3.11 Open Water

Employees working over or near water, where the danger of drowning exists, must be provided with U.S. Coast Guard-approved life jackets or buoyant work vests. Prior to and after each use, the buoyant work vests or life preservers must be inspected for defects that would alter their strength or buoyancy. Defective units must not be used.

And should a worker fall into the water, OSHA requires (29 CFR 1926.106(c)) that ring buoys with at least 90 feet of the line must be provided and readily available for emergency rescue operations. The distance between ring buoys must not exceed 200 feet. Another remedial action required by OSHA (29 CFR 1926.106(d)) is the use of lifesaving skiffs.

OSHA requires that at least one lifesaving skiff must be immediately available at locations where employees are working over or adjacent to water and must include the following provisions.

- The skiff must be in the water or capable of being quickly launched by one person.
- At least one person must be present and specifically designated to respond to water emergencies and always operate the skiff when there are employees above water.
- When the operator is on break another operator must be designated to provide requisite coverage when there are employees above water.
- The designated operator must either have the skiff always staffed or have someone remain in the immediate area such that the operator can quickly reach the skiff and perform rescue services.
- The skiff operator may be assigned other tasks provided the tasks do not interfere with the operator’s ability to quickly reach the skiff.
- A communication system, such as a walkie-talkie, must be used to inform the skiff

operator of an emergency and to inform the skiff operator where the skiff is needed.
- The skiff must be equipped with both a motor and oars.

Regarding the number of skiffs required and the appropriate maximum response time, the following factors must be evaluated:

- The number of work locations where there is a danger of falling into water.
- The distance to each of those locations.
- Water temperature and currents.
- Other hazards such as, but not limited to, rapids, dams, and water intakes.

Other regulations that present H&S practices and PPE for work on or near water include: 29 CFR 1910, Subpart T (401 – 440)

3.4 Biological Hazards

3.4.1 Animals

There is a possibility of encountering wildlife including reptiles, rodents, and other small and medium-size mammals. Langan personnel are to avoid interacting with any wildlife.

3.4.2 Insects

Ticks and other biting or stinging insects may be encountered during site operations. Langan personnel should take necessary precautions including donning long sleeve shirts and insecticide to prevent bites and stings. After fieldwork, Langan personnel should perform a complete visual inspection of their clothing to insure they are not inadvertently harboring ticks. If they do observe a tick bite, they are to contact the HSM or HSO and report the event.

3.4.3 Plants

Poisonous plants may be encountered during site operations. Langan personnel should take necessary precautions including donning long sleeve shirts and applying preventative poison Ivy/Sumac lotion to prevent or limit the effects of exposure. If after fieldwork, Langan employees do observe a reaction to poisonous plant exposure, they are to contact the HSM or HSO and report the event.

3.4.4 Mold

This section is restricted to subsurface investigations where sampling soil, groundwater, soil or

sub-slab vapor or ambient air in an indoor environment with slight to moderate mold impact. Mold exposure symptoms include nasal stuffiness, eye irritation, or wheezing.

The Langan field engineer is required to don a ½ face respirator with a minimum p-100 particulate filter and Tyvek™ type overclothing before entering mold impacted indoor work area. The Langan field engineer must be medically cleared and have been properly fitted for a respirator before donning one.

3.5 Additional Safety Analysis

3.5.1 Presence of Non-Aqueous Phase Liquids (NAPL)

Special care and PPE should be considered when NAPL is observed as NAPL is a typically flammable fluid and releases VOCs known to be toxic and/or carcinogenic. If NAPL is present in a monitoring well, vapors from the well casing may contaminate the work area breathing zone with concentrations of VOCs potentially exceeding health and safety action levels. In addition, all equipment used to monitor or sample NAPL (or ground water from wells containing NAPL) must be intrinsically safe. Equipment that directly contacts NAPL must also be resistant to organic solvents.

At a minimum, a PID should be used to monitor for VOCs when NAPL is observed. If NAPL is expected to be observed in an excavation or enclosed area, air monitoring must be started using calibrated air monitoring equipment designed to sound an audio alarm when atmospheric concentrations of VOC are within 10% of the LEL. In normal atmospheric oxygen concentrations, the LEL monitoring may be done with a Wheatstone bridge/catalytic bead type sensor (i.e., MultiRAE). However, in oxygen-depleted atmospheres (confined space), only an LEL designed to work in low-oxygen environments may be used. Best practices require that the LEL monitoring unit be equipped with a long sniffer tube to allow the LEL unit to remain outside the UST excavation.

When NAPL is present, Langan personnel are required to always use disposable nitrile gloves to prevent skin contact with contaminated materials. They should also consider having available a respirator and protective clothing (Tyvek® overalls), especially if NAPL is in abundance and there are high concentrations of VOCs.

All contaminated disposables including PPE and sampling equipment must be properly disposed of in labeled 55-gallon drums.

3.6 Job Safety Analysis

A Job Safety Analysis (JSA) is a process to identify existing and potential hazards associated with each job or task so these hazards can be eliminated, controlled, or minimized. A JSA will be performed at the beginning of each workday, and additionally whenever an employee begins a new task or moves to a new location. All JSAs must be developed and reviewed by all parties involved. A blank JSA form and documentation of completed JSAs are in Attachment G.

4.0 PERSONNEL TRAINING

4.1 Basic Training

Completion of an initial 40-hour HAZWOPER training program as detailed in OSHA's 29 CFR 1910.120(e) is required for all employees working on a site engaged in hazardous substance removal or other activities which expose or potentially expose workers to hazardous substances, health hazards, or safety hazards as defined by 29 CFR 1910.120(a). Annual 8-hour refresher training is also required to maintain competencies to ensure a safe work environment. In addition to these training requirements, all employees must complete the OSHA 10-hour Construction Safety and Health training, and supervisory personnel must also receive eight additional hours of specialized management training. Training records are maintained by the HSM.

4.2 Initial Site-Specific Training

Training will be provided to specifically address the activities, procedures, monitoring, and equipment for site operations at the beginning of each field mobilization and the beginning of each discrete phase of work. The training will include the site and facility layout, hazards, and emergency services at the site, and will detail all the provisions contained within this HASP. For a HAZWOPER operation, training on the site must be for a minimum of 3 days. Specific issues that will be addressed include the hazards described in Section 3.0.

4.3 Tailgate Safety Briefings

Before starting work each day or as needed, the Langan HSO will conduct a brief tailgate safety meeting to assist site personnel in conducting their activities safely. Tailgate meetings will be documented in Attachment H. Briefings will include at a minimum the following:

- Work plan for the day.
- Review of safety information relevant to planned tasks and environmental conditions.
- New activities/tasks being conducted.
- Driving conditions/hazards/designated parking areas.
- Results of Jobsite Safety Inspection Checklist.

- Changes in work practices.
- Safe work practices; and
- Discussion and remedies for noted or observed deficiencies.

5.0 MEDICAL SURVEILLANCE

All personnel who will be performing fieldwork involving potential exposure to toxic and hazardous substances (defined by 29 CFR 1910.120(a)) will be required to have passed an initial baseline medical examination, with follow-up medical exams thereafter, consistent with 29 CFR 1910.120(f). Medical evaluations will be performed by, or under the direction of, a physician board-certified in occupational medicine.

Additionally, personnel who may be required to perform work while wearing a respirator must receive medical clearance as required under CFR 1910.134(e), *Respiratory Protection*. Medical evaluations will be performed by, or under the direction of, a physician board-certified in occupational medicine. Results of medical evaluations are maintained by the HSM.

5.1 Mercury Monitoring

Langan includes medical monitoring for mercury during the initial baseline and annual physical.

5.2 Coronavirus

General Preventative Measures

Field personnel must follow general proper hygiene measures while in the field including:

- Avoid touching eyes, nose, and mouth.
- Cover coughs or sneezes with tissue and throw in the trash.
- Wash hands often with soap and water for 20 seconds after going to the bathroom, before eating, after blowing nose, coughing, or sneezing.
- Use hand sanitizer with at least 60% alcohol if soap and water are not available.
- Avoid physical contact with other people (e.g., no handshakes).
- Maintain a safe distance of at least six feet from other people (social distancing).
- Wear face coverings when around other workers to minimize the spread of COVID-19. (May be required in certain states or locations.)

Construction Trailers

Employees should avoid the use of shared construction trailers or where employees cannot

maintain a safe distance (minimum 6 feet) from other workers. If trailer use is needed, areas such as desks, phones, chairs, and other common areas, should be cleaned and disinfected before and after use. Protocols should be developed to minimize trailer use to essential personnel, restrict use from any workers who are ill or showing symptoms of being ill, use face coverings and ensure a safe distance of six feet can be established between workers.

Communication

Include Coronavirus topics and prevention topics in daily tailgate meetings to ensure Coronavirus awareness is communicated daily. Discussions can focus on general topics including social distancing, prevention measures for field personnel, signs and symptoms, and recent news on the Coronavirus. Site-specific topics should include minimizing face-to-face contact, disinfecting/sterilizing field equipment, use of PPE to reduce exposure, site security, use of face coverings, and other potential exposure issues/concerns.

Sick/Ill Workers

No Langan employee is permitted to be onsite when ill and/or showing potential symptoms of the Coronavirus. Symptoms of the Coronavirus may appear 2-14 days after exposure and can range from mild to severe. The most common symptoms include fever, fatigue, dry cough, shortness of breath chills, repeated shaking with chills, muscle pain, headache, sore throat, or new loss of taste or smell. If an employee or subcontractor is observed being ill or exhibiting symptoms of Coronavirus, employees must immediately utilize their Stop Work Authority and contact their project manager to address the situation. If an employee observes another worker onsite exhibiting symptoms of Coronavirus, immediately utilize Stop Work Authority, notify their project manager, and site manager or safety officer. Work should resume when the safety and health of Langan and subcontractors is adequately addressed.

6.0 PERSONAL PROTECTIVE EQUIPMENT

6.1 Levels of Protection

Langan will provide PPE to Langan employees to protect them from the specific hazards they are likely to encounter on-site. Directly hired contractors will provide their employees with equivalent PPE to protect them from the specific hazards likely to be encountered on-site. Selection of the appropriate PPE must take into consideration: (1) identification of the hazards or suspected hazards; (2) potential exposure routes; and (3) the performance of the PPE construction (materials and seams) in providing a barrier to these hazards.

Human exposure to contaminants found in the subsurface can occur through three primary routes:

- Inhalation of gases, vapors, dust, or mists is a common route of exposure. Chemicals can enter and irritate the airways and the lungs. They can become deposited in the airways or can be absorbed through the lungs into the bloodstream.
- Direct contact of contaminants with the skin or eyes is a common route of exposure. Some substances are absorbed through the skin and can enter the bloodstream. Broken, cut, or cracked skin will allow substances to enter the body more easily.
- Ingestion or swallowing of food, drink, or other substances is the third route of exposure. Chemicals that get in or on food, utensils, or hands can be ingested. Substances can be absorbed into the blood.

Based on anticipated site conditions and the proposed work activities to be performed at the site, Level D protection will be used. The upgrading/downgrading of the level of protection will be based on continuous air monitoring results as described in Section 6.0 (when applicable). The decision to modify standard PPE will be made by the site HSO or FTL after conferring with the PM. The levels of protection are described below.

Level D Protection (as needed)

- Safety glasses with side shields or chemical splash goggles
- Safety boots/shoes
- Coveralls (Tyvek® or equivalent)
- Hard hat
- Long sleeve work shirt and work pants
- Nitrile gloves
- Hearing protection
- Reflective safety vest

Level D Protection (Modified, as needed)

- Safety glasses with side shields or chemical splash goggles
- Safety boots/shoes (toe-protected)
- Disposable chemical-resistant boot covers.
- Coveralls (poly-coated Tyvek or equivalent to be worn when contact with wet contaminated soil, groundwater, or non-aqueous phase liquids is anticipated)
- Hard hat
- Long sleeve work shirt and work pants

- Nitrile gloves
- Hearing protection (as needed)
- Personal floatation device (for work within 5 ft of the water)
- Reflective traffic vest

Level C Protection (as needed)

- Full or Half face, air-purifying respirator, with NIOSH approved High-Efficiency Particulate Air (HEPA) filter.
- Inner (latex) and outer (nitrile) chemical-resistant gloves
- Safety glasses with side shields or chemical splash goggles
- Chemical-resistant safety boots/shoes
- Hard hat
- Long sleeve work shirt and work pants
- Coveralls (Tyvek® or equivalent)
- Hearing protection (as needed)
- Reflective safety vest

The action levels used in determining the necessary levels of respiratory protection and upgrading to Level C are summarized in Table 4. The written Respiratory Protection Program is maintained by the HSM and is available if needed. The monitoring procedures and equipment are outlined in Section 6.0 (when applicable).

6.2 Respirator Fit-Test.

All Langan employees who may be exposed to hazardous substances at the work site must be in possession of a full or half face piece air-purifying respirator and have been successfully fit-tested within the past year. Fit-test records are maintained by the HSM.

6.3 Respirator Cartridge Change-Out Schedule

Respiratory protection is required to be worn when certain action levels (Table 2) are reached. A respirator cartridge change-out schedule has been developed to comply with 29 CFR 1910.134. The respirator cartridge change-out schedule for this project is as follows:

- Cartridges must be removed and disposed of at the end of each shift when cartridges become wet or the wearer experiences a breakthrough, whichever occurs first.
- If the humidity exceeds 85%, then cartridges must be removed and disposed of after 4 hours of use.

Respirators must not be stored at the end of the shift with contaminated cartridges left on. Cartridges must not be worn on the second day, no matter how short the time period was the previous day they were used.

7.0 AIR QUALITY MONITORING AND ACTIONS LEVELS

7.1 Monitoring During Site Operations

Atmospheric air monitoring results may be collected and used to provide data to determine when exclusion zones need to be established and when certain levels of personal protective equipment are required. For all instruments, there are Site-specific action-level criteria that are used in making field health and safety determinations. Other data, such as the visible presence of contamination or the steady state nature of air contaminant concentration, are also used in making field health and safety decisions. Therefore, the HSO may establish an exclusion zone or require a person to wear a respirator even though atmospheric air contaminant concentrations are below established HASP action levels.

During site work involving disturbance of petroleum-impacted or fill material, real-time air monitoring may be conducted for methane and VOCs. A MultiRAE LEL/Oxygen (O2) meter and FID will be used to monitor the LEL of methane, and a PID and/or FID will be used to monitor concentrations of VOCs at personnel breathing-zone height. Air monitoring will be the responsibility of the HSO or designee. Air monitoring may be conducted during intrusive activities associated with the completion of excavation, debris removal, and soil grading. All manufacturers' instructions for instrumentation and calibration will be available onsite.

Subcontractors' air monitoring plans must be equal to or more stringent than the Langan plan.

An air monitoring calibration log is provided in Attachment D of this HASP.

7.1.1 Volatile Organic Compounds

Monitoring with a PID, such as a MiniRAE 2000 (10.6v) or equivalent may occur during intrusive work in the Areas of Concern (AOCs). Colorimetric Indicator Tubes for benzene may be used as a backup for the PID if measurements remain above background monitor every 2 hours. The HSO will monitor the employee's breathing zone at least every 30 minutes, or whenever there is any indication that concentrations may have changed (odors, visible gases, etc.) since the last measurement. If VOC levels are observed above 5 ppm for longer than 5 minutes or if the site PPE is upgraded to Level C, the HSO will begin monitoring the site perimeter at a location downwind of the AOC every 30 minutes in addition to the employee breathing zone. Instrument action levels for monitored gases are provided in Table 4.

7.1.2 Metals

Based upon the site historic fill, there is a potential for the soils to contain Polycyclic Aromatic Hydrocarbons (PAHs) and metals. During invasive procedures which have the potential for creating airborne dust, such as excavation of dry soils, a real-time airborne dust monitor such as a Mini-Ram may be used to monitor for air particulates. The HSO will monitor the employee's breathing zone at least every 30 minutes, or whenever there is any indication that concentrations may have changed (appearance of visible dust) since the last measurement. If dust levels are observed to be greater than 0.100 milligrams per cubic meter (mg/m^3) or visible dust is observed for longer than 15 minutes or if the site PPE is upgraded to Level C, the HSO will begin monitoring the site perimeter at a location downwind of the AOC every 30 minutes in addition to the employee breathing zone. Instrument action levels for dust monitoring are provided in Table 4.

7.1.3 Methane

During soil excavation or other intrusive activities, direct reading air monitoring may be performed in the excavation area to determine exposure to workers. Monitoring with an LEL/O2 meter and FID may occur during intrusive work in the AOCs. The HSO will monitor the employee's breathing zone at least hourly during intrusive activities. If LEL levels are observed above 20% the professional engineer (PE) or their designee will stop work and evacuate the area; warn others; and determine source of readings and take corrective actions. The Contractor will be responsible for mitigating explosive gas levels.

7.2 Monitoring Equipment Calibration and Maintenance

Instrument calibration must be documented and included in a dedicated safety and health logbook or on separate calibration pages of the field book. All instruments must be calibrated before and after each shift. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument responses.

All instruments must be operated in accordance with the manufacturers' specifications. Manufacturers' literature, including an operation manual for each piece of monitoring equipment, will be maintained on-site by the HSO for reference.

7.3 Determination of Background Levels

Background (BKD) levels for VOCs, dust and methane will be established prior to intrusive activities within the AOC at an upwind location. A notation of BKD levels will be referenced in the daily monitoring log. BKD levels are a function of prevailing conditions. BKD levels will be taken in an appropriate upwind location as determined by the HSO.

Table 4 lists the instrument action levels.

8.0 COMMUNITY AIR MONITORING PROGRAM

Community air monitoring may be conducted in compliance with local standards. If conducted, Langan will implement the generic CAMP outlined below amended to comply with local conditions or standards:

Monitoring for dust and odors will be conducted during all ground intrusive activities by the FTL. Continuous monitoring of the perimeter of the work zones for odor, VOCs, and dust may be required for all ground intrusive activities such as soil excavation and handling activities. The work zone is defined as the general area in which machinery is operating in support of remediation activities. A portable PID will be used to monitor the work zone and for periodic monitoring for VOCs during activities such as soil and groundwater sampling and soil excavation. The site perimeter will be monitored for fugitive dust emissions by visual observations as well as instrumentation measurements (if required). When required, particulate or dust will be monitored continuously with real-time field instrumentation that will meet, at a minimum, the local standards or, default to the performance standards below:

If VOC monitoring is required, the following actions will be taken based on VOC levels measured:

- If total VOC levels exceed 5 ppm above background for the 15-minute average at the perimeter, work activities will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring.
- If total VOC levels at the downwind perimeter of the hot zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps work activities will resume provided that the total organic vapor level is 200 feet downwind of the hot zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less – but in no case less than 20 feet, is below 5 ppm above background for the 15-minute average.
- If the total VOC level is above 25 ppm at the perimeter of the hot zone, activities will be shut down.

If dust monitoring with field instrumentation is required, the following actions will be taken based on instrumentation measurements:

- If the downwind particulate level is 100 micrograms per cubic meter ($\mu g/m^3$) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed

leaving the work area, then dust suppression must be employed. Work may continue with dust suppression techniques provided that downwind particulate matter less than 10 microns (PM10) levels do not exceed 150 µg/m³ above the background level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM10 levels are greater than 150 µg/m³ above the background level, work must be stopped, and a re-evaluation of activities initiated. Work can resume if dust suppression measures and other controls are successful in reducing the downwind PM10 concentration to within 150 µg/m³ of the upwind level and in preventing visible dust migration.

8.1 Dust Suppression Techniques

Preventative measures for dust generation may include wetting site fill and soil, construction of an engineered construction entrance with a gravel pad, a truck wash area, covering soils with tarps, and limiting vehicle speeds to five miles per hour.

Work practices to minimize odors and vapors include limiting the time that the excavations remain open, minimizing stockpiling of contaminated-source soil, and minimizing the handling of contaminated material. Offending odor and organic vapor controls may include the application of foam suppressants or tarps over the odor or VOC source areas. Foam suppressants may include biodegradable foams applied over the source material for short-term control of the odor and VOCs.

If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include direct load-out of soils to trucks for off-site disposal; use of chemical odorants in spray or misting systems; and use of staff to monitor odors in surrounding neighborhoods.

Where odor nuisances have developed during remedial work and cannot be corrected, or where the release of nuisance odors cannot otherwise be avoided due to on-site conditions or proximity to sensitive receptors, odor control will be achieved by sheltering excavation and handling areas under tented containment structures equipped with appropriate air venting/filtering systems.

9.0 WORK ZONES AND DECONTAMINATION

9.1 Site Control

Work zones are intended to control the potential spread of contamination throughout the site and to assure that only authorized individuals are permitted into potentially hazardous areas. Specific

zones will be established on the work site by the Contractor when operations begin for each task requiring such delineation. Maps depicting the zones will be available at the Site.

Any person working in an area where the potential for exposure to site contaminants exists will only be allowed access after providing the HSO with proper training and medical documentation.

Exclusion Zone (EZ) - All activities which may involve exposure to site contaminants, hazardous materials, and/or conditions should be considered an EZ. Decontamination of field equipment will also be conducted in the Contaminant Reduction Zone (CRZ) which will be located on the perimeter of the EZ. The EZ and the CRZ will be delineated by cones, tapes, or other means. The HSO may establish more than one EZ where different levels of protection may be employed, or different hazards exist. The size of the EZ must be determined by the HSO allowing adequate space for the activity to be completed, field members, and emergency equipment.

9.2 Contamination Zone

9.2.1 Personnel Decontamination Station

Personal hygiene, coupled with diligent decontamination, will significantly reduce the potential for exposure.

9.2.2 Minimization of Contact with Contaminants

During the completion of all site activities, personnel should attempt to minimize the chance of contact with contaminated materials. This involves a conscientious effort to keep "clean" during site activities. All personnel should minimize kneeling, splash generation, and another physical contact with contamination as PPE is intended to minimize accidental contact. This may minimize the degree of decontamination required and the generation of waste materials from site operations.

Field procedures will be developed to control spray and runoff and to ensure that unprotected personnel working nearby are not affected.

9.2.3 Personnel Decontamination Sequence

Decontamination may be performed by removing all PPE used in EZ and placing it in drums/trash cans at the CRZ. Baby wipes should be available for wiping hands and face. Drums/trash cans will be labeled by the field crews in accordance with all local, state, and federal requirements. Management plans for contaminated PPE, and tools are provided below.

9.2.4 Emergency Decontamination

If circumstances dictate that contaminated clothing cannot be readily removed, then remove gross contamination and wrap injured personnel with clean garments/blankets to avoid contaminating other personnel or transporting equipment. If the injured person can be moved, he/she will be decontaminated by site personnel as described above before emergency responders handle the victim. If the person cannot be moved because of the extent of the injury (a back or neck injury), provisions must be made to ensure that emergency response personnel will be able to respond to the victim without being exposed to potentially hazardous atmospheric conditions. If the potential for inhalation hazards exists, such as with open excavation, this area will be covered with polyethylene sheeting to eliminate any potential inhalation hazards. All emergency personnel should be immediately informed of the injured person's condition, and potential contaminants, and provided with all pertinent data.

9.2.5 Hand-Held Equipment Decontamination

Hand-held equipment includes all monitoring instruments as stated earlier, samples, hand tools, and notebooks. The hand-held equipment is dropped at the first decontamination station to be decontaminated by one of the decontamination team members. These items must be decontaminated or discarded as waste prior to removal from the CRZ.

To aid in decontamination, monitoring instruments can be sealed in plastic bags or wrapped in polyethylene. This will also protect the instruments against contaminants. The instruments will be wiped clean using wipes or paper towels if contamination is visually evident. Sampling equipment, hand tools, etc. will be cleaned with non-phosphorous soap to remove any potentially contaminated soil and rinsed with deionized water. All decontamination fluids will be containerized and stored on-site pending waste characterization sampling and appropriate off-site disposal.

9.2.6 Heavy Equipment Decontamination

All heavy equipment and vehicles arriving at the work site will be free from contamination from offsite sources. Any vehicles arriving to work that are suspected of being impacted will not be permitted on the work site. Potentially contaminated heavy equipment will not be permitted to leave the EZ unless it has been thoroughly decontaminated and visually inspected by the HSO or his designee.

9.3 Support Zone

The support zone or cold zone will include the remaining areas of the job site. Break areas and support facilities (including equipment storage and maintenance areas) will be in this zone. No

equipment or personnel will be permitted to enter the cold zone from the hot zone without passing through the decontamination station in the warm zone (if necessitated). Eating, smoking, and drinking will be allowed only in this area.

9.4 Communications

The following communications equipment will be utilized as appropriate.

- Telephones - A cellular telephone will be located with the HSO for communication with the HSM and emergency support services/facilities.
- Hand Signals - Hand signals must be used by field teams, along with the buddy system. The entire field team must know them before operations commence and their use covered during site-specific training. Typical hand signals are the following:

Hand Signal	Meaning
Hand gripping throat	Out of air, cannot breathe
Grip your partner's wrists or place both hands around the waist	Leave immediately without debate
Hands on top of head	Need assistance
Thumbs up	OK; I am all right; I understand
Thumbs down	No; negative
Simulated "stick" break with fists	Take a break; stop work

9.5 The Buddy System

When working in teams of two or more, workers will use the "buddy system" for all work activities to ensure that rapid assistance can be provided in the event of an emergency. This requires work groups to be organized such that workers can remain close together and maintain visual contact with one another. Workers using the "buddy system" have the following responsibilities:

- Provide his/her partner with assistance.
- Observe his/her partner for signs of chemical or heat exposure.
- Periodically check the integrity of his/her partner's PPE.
- Notify the HSO or other site personnel if emergency service is needed.

10.0 NEAREST MEDICAL ASSISTANCE

The address and telephone number of the nearest hospital:

Coney Island Hospital
2601 Ocean Parkway
Brooklyn, New York

718-616-3000

A map with directions to the hospital is shown in Figure 2. This information will either be posted prominently at the site or will be available to all personnel all the time. Further, all field personnel, including the HSO & FTL, will know the directions to the hospital.

11.0 STANDING ORDERS/SAFE WORK PRACTICES

The standing orders, which consist of a description of safe work practices that must always be followed while on-site by Langan employees and contractors, are shown in Attachment A. The site HSO and FTL each have the responsibility for enforcing these practices. The standing orders will be posted prominently at the site or are always made available to all personnel. Those who do not abide by these safe work practices will be removed from the site.

12.0 SITE SECURITY

No unauthorized personnel must be permitted access to the work areas.

13.0 UNDERGROUND UTILITIES

As provided in Langan's Underground Utility Clearance Guidelines, the following safe work practices should be followed by Langan personnel and the contractor before and during subsurface work in accordance with federal, state, and local regulations:

- Obtain available utility drawings from the property owner/client or operator.
- Provide utility drawings to the project team.
- In the field, mark the proposed area of subsurface disturbance (when possible).
- Ensure that the utility clearance system has been notified.
- Ensure that utilities are marked before beginning subsurface work.
- Discuss subsurface work locations with the owner/client and contractors.
- Obtain approval from the owner/client and operators for proposed subsurface work locations.
- Use safe digging procedures when applicable.
- Stay at least ten feet from all equipment performing subsurface work.
- Ensure that the one-call (811) system or state utility hotline in your area has been notified. Private mark-outs may require the use of ground penetrating radar (GPR).
- Attempt to stay at least 15 feet from subsurface electrical lines and at least 10 feet from all other utility lines or mark-outs. Minimum clearance distances may increase as per chart below.

- Hand auger subsurface boreholes and test pits to 5 feet below ground surface.

TABLE A—MINIMUM CLEARANCE DISTANCES

Voltage (nominal, kV, alternating current)	Minimum clearance distance (feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25
over 500 to 750	35
over 750 to 1,000	45
over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

14.0 SITE SAFETY INSPECTION

The Langan HSO or alternate will check the work area daily, at the beginning and end of each work shift, or more frequently to ensure safe work conditions. The HSO or alternate must complete the Jobsite Safety Inspection Checklist, found in Attachment F. Any deficiencies must be shared with the FTL, HSM, and PM and will be discussed at the daily tailgate meeting.

15.0 HAND AND POWER TOOLS

All hand- and electric-power tools and similar equipment must be maintained in a safe operating condition. All electric-power tools must be inspected before initial use. Damaged tools must be removed immediately from service or repaired. Tools must be used only for the purpose for which they were designed. All users must be properly trained in their safe operation.

16.0 EMERGENCY RESPONSE

16.1 General

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff is essential. Specific elements of emergency support procedures that are addressed in the following subsections include communications, local emergency support units, and preparation for medical emergencies, first aid for injuries incurred on site, record keeping, and emergency site evacuation procedures. In case of emergency, in addition to 911, call *WorkCare - Incident Intervention®* at 1-888-479-7787 to report their injuries. For all other communications, contact the Langan Incident Hotline at **973-560-4699** as soon as possible.

Should outside assistance be needed for accidents, fire, or release of hazardous substances, the emergency numbers will be available and posted at the site (Table 5) where a readily accessible telephone is made available for emergency use.

Also, in the event of an incident where a team member becomes exposed or suffers from an acute symptom from contact with site materials and must be taken to a hospital, a short medical data sheet (Attachment C) for that individual will be made available to the attending physician. The medical data sheet will include the following:

- Name, address, home phone
- Age, height, weight
- Name of person to be notified in case of an accident.
- Allergies
- Sensitivities
- Does he/she wear contact lenses?
- Short checklist of previous illness
- Name of personal physician and phone
- Name of company physician and phone
- Prescription and non-prescription medications currently used.

An incident reporting form is included in Attachment C.

16.2 Responsibilities

16.2.1 Health and Safety Officer (HSO)

The HSO is responsible for ensuring that all personnel are evacuated safely, and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The HSO is responsible for ensuring the HSM is notified of all incidents, all injuries, near misses, fires, spills, releases, or equipment damage. The HSO is required to immediately notify the HSM of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the HSM can notify OSHA within the required time limit.

16.2.2 Emergency Coordinator

The HSO or their designated alternate will serve as the Emergency Coordinator. The Emergency Coordinator is responsible for ensuring that all personnel are evacuated safely, and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. They are also responsible for ensuring the HSM is notified of all incidents, all injuries, near misses, fires, spills, releases, or equipment damage. The Emergency Coordinator is required to immediately notify the HSM of any fatalities or catastrophes (three or more workers injured and hospitalized.

The Emergency Coordinator must locate emergency phone numbers and identify hospital routes prior to beginning work on the sites. The Emergency Coordinator must make necessary arrangements to be prepared for any emergencies that could occur.

The Emergency Coordinator is responsible for implementing the Emergency Response Plan.

16.2.3 Site Personnel

Project site personnel are responsible for knowing the Emergency Response Plan and the procedures contained herein. All personnel are expected to notify the Emergency Coordinator of situations that could constitute a site emergency. Project site personnel, including all subcontractors, will be trained in the Emergency Response Plan.

16.3 Communications

Once an emergency has been stabilized, the injured Langan personnel should contact *WorkCare - Incident Intervention®* at 1-888-479-7787 to report their injuries. For all other communications, contact the Langan Incident Hotline at **973-560-4699** as soon as possible.

16.4 Local Emergency Support Units

To be able to deal with any emergency that might occur during investigative activities at the site, the Emergency Notification Numbers (Table 5) will be posted and provided to all personnel conducting work within the EZ.

Figure 2 shows the hospital route map. Outside emergency number 911 and local ambulance should be relied on for response to medical emergencies and transport to emergency rooms. Always contact first responders when there are serious or life-threatening emergencies on the site. Project personnel are instructed not to drive injured personnel to the Hospital. In the event of an injury, provide first aid and keep the injured party calm and protected from the elements, and treat for shock when necessary.

16.5 Pre-Emergency Planning

Langan will communicate directly with administrative personnel from the emergency room at the hospital to determine whether the hospital has the facilities and personnel needed to treat cases of trauma resulting from any of the contaminants expected to be found on the site. Instructions for finding the hospital will be posted conspicuously in the site office and each site vehicle.

16.6 Emergency Medical Treatment

The procedures and rules in this HASP are designed to prevent employee injury. However, if an injury occurs, no matter how slight, it will be reported to the HSO immediately. First-aid equipment will be available on-site at the following locations:

- First Aid Kit: Contractor Vehicles
- Emergency Eye Wash: Contractor Vehicles

During the site safety briefing, project personnel will be informed of the location of the first aid station(s) that has been set up. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. First-aid instructions provided from off-site doctors or paramedics, before an emergency-response squad arrives at the site or before the injured person can be transported to the hospital, will be followed closely. Only in non-emergency situations may an injured person be transported to an urgent care facility. Due to hazards that may be present at the site and the conditions under which operations are conducted, an emergency may develop. Emergencies can be characterized as injury or acute chemical exposure to personnel, fire or explosion, environmental release, or hazardous weather conditions.

16.8 Emergency Site Evacuation Routes and Procedures

All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs as a result of the site investigation activities, including but not limited to fire, explosion, or significant release of toxic gas into the atmosphere, the Langan Project Manager will be verbally notified immediately. All heavy equipment will be shut down and all personnel will evacuate the work areas and assemble at the nearest intersection to be accounted for and to receive further instructions.

If an emergency arises, the FTL will implement an immediate evacuation of all project personnel due to immediate or impending danger. The FTL will also immediately communicate with the contractor to coordinate any needed evacuation of the property.

The FTL or Site Supervisor will give necessary instructions until the Designated Incident Commander (IC) assumes control. After the emergency has been resolved, the FTL or Site Supervisor will coordinate with the IC and indicate when staff should resume their normal duties. If dangers are present for those at the designated assembly point, another designated location of assembly will be established.

It will be the responsibility of the FTL or Site Supervisor to report a fire or emergency, assess the seriousness of the situation, and initiate emergency measures until the arrival of the local fire

fighters or other first responders, should they be necessary. The FTL, working with emergency responders, may also order the closure of the Site for an indefinite period if it is deemed necessary.

Under no circumstances will incoming visitors be allowed to proceed to the area of concern once an emergency evacuation has been implemented. Visitors or other persons present in the emergency must be instructed to evacuate the area. The FTL will ensure that access roads are not obstructed and will remain on-site to provide stand-by assistance upon the arrival of emergency personnel.

If it is necessary to temporarily control traffic in the event of an emergency, those persons controlling traffic will wear proper reflection warning vests until the arrival of police or fire personnel.

16.8.1 Designated Assembly Locations

All personnel will evacuate the site and assemble at a designated assembly location. The assembly location will be designated by Langan personnel and discussed during each shift's pre-job safety briefing.

16.8.2 Accounting for Personnel

All contractor and subcontractor supervisors are responsible for the accounting of all personnel assembled at the designed assembly area. The Designated Incident Commander must be notified if personnel are not found.

16.9 Fire Prevention and Protection

In the event of a fire or explosion, procedures will include immediately evacuating the site and notification of the Langan Project Manager of the investigation activities. Portable fire extinguishers will be provided at the work zone. The extinguishers located in the various locations should also be identified prior to the start of work. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

16.9.1 Fire Prevention

Fires will be prevented by adhering to the following precautions:

- Good housekeeping and storage of materials.
- Storage of flammable liquids and gases away from oxidizers.
- Shutting off engines to refuel.

- Grounding and bonding metal containers during transfer of flammable liquids.
- Use of UL approved flammable storage cans.
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities.

The person responsible for the control of fuel source hazards and the maintenance of fire prevention and/or control equipment is the HSO.

16.10 Significant Vapor Release

Based on the proposed tasks, the potential for a significant vapor release is low. However, if a release occurs, the following steps will be taken:

- Move all personnel to an upwind location. All non-essential personnel must evacuate.
- Upgrade to Level C Respiratory Protection.
- Downwind perimeter locations must be monitored for volatile organics.
- If the release poses a potential threat to human health or the environment in the community, the Emergency Coordinator must notify the Langan Project Manager.
- Local emergency response coordinators will be notified.

16.11 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Material Safety Data Sheet (MSDS) will be followed, when necessary.

SKIN AND EYE: Use copious amounts of soap and water from eye-wash kits and portable hand-wash stations.

CONTACT: Wash/rinse affected areas thoroughly, then provide appropriate medical attention. Skin must also be rinsed for 15 minutes if contact with caustics, acids, or hydrogen peroxide occurs. Affected items of clothing must also be removed from contact with skin.

Providing wash water and soap will be the responsibility of each individual contractor or subcontractor on-site.

16.12 Decontamination during Medical Emergencies

If emergency lifesaving first aid and/or medical treatment is required, normal decontamination procedures may need to be abbreviated or omitted. The HSO or designee will accompany contaminated victims to the medical facility to advice on matters involving decontamination when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment, or aggravate the problem. Respiratory equipment must always be removed.

Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed on site, a plastic barrier placed between the injured individual and clean surfaces should be used to help prevent contamination of the inside of ambulances and/or medical personnel. Outer garments may then be removed at the medical facility. No attempt will be made to wash or rinse the victim if his/her injuries are life threatening unless it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, normal decontamination procedures will be followed.

16.13 Adverse Weather Conditions

In the event of adverse weather conditions, the HSO will determine if work continues without potentially risking the safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related working conditions (hail, rain, snow, ice, high winds).
- Limited visibility (fog).
- Potential for electrical storms.
- Earthquakes.
- Other major incidents.

Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The HSO will determine the need to cease field operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

16.14 Spill Control and Response

All small spills/environmental releases must be contained as close to the source as possible. Whenever possible, the SDS will be consulted to assist in determining proper waste characterization and the best means of containment and cleanup. For small spills, sorbent materials such as sand, sawdust, or commercial sorbents should be placed directly on the substance to contain the spill and aid recovery. Any acid spills should be diluted or neutralized carefully prior to attempting recovery. Berms of earthen or sorbent materials can be used to contain the leading edge of the spills. All spill containment materials will be properly disposed of. An exclusion zone of 50 to 100 feet around the spill area should be established depending on the size of the spill.

All contractor vehicles must have spill kits on them with enough material to contain and absorb the worst-case spill from that vehicle. All vehicles and equipment must be inspected prior to being admitted on-site. Any vehicle or piece of equipment that develops a leak will be taken out of service and removed from the job site.

The following seven steps must be taken by the Emergency Coordinator:

1. Determine the nature, identity, and amounts of major spills.
2. Make sure all unnecessary persons are removed from the spill area.
3. Notify the HSO immediately.
4. Use proper PPE in consultation with the HSO.
5. If a flammable liquid, gas, or vapor is involved, remove all ignition sources, and use non-sparking and/or explosion-proof equipment to contain or clean up the spill (diesel-only vehicles, air-operated pumps, etc.)
6. If possible, try to stop the leak with the appropriate material.
7. Remove all surrounding materials that can react or compound with the spill.

In addition to the spill control and response procedures described in this HASP, Langan personnel will coordinate with the designated project manager relative to spill response and control actions. Notification to the Project Manager must be immediate and, to the extent possible, include the following information:

- Time and location of the spill.
- Type and nature of the material spilled.
- Amount spilled.
- Whether the spill has affected or has a potential to affect a waterway or sewer.
- A brief description of affected areas/equipment.
- Whether the spill has been contained.
- Expected time of cleanup completion. If spill cleanup cannot be handled by Langan's on-site personnel alone, such fact must be conveyed to the Project Manager immediately.

Langan field personnel must notify the project manager when they observe a spill or encounter conditions suggesting one might have occurred.

16.15 Emergency Equipment

The following minimum emergency equipment must be kept and maintained on site:

- Industrial first aid kit.
- Fire extinguishers (one per site).

16.16 Restoration and Salvage

After an emergency, prompt restoration of utilities, fire protection equipment, medical supplies, and other equipment will reduce the possibility of further losses. Some of the items that may need to be addressed are:

- Refilling fire extinguishers.
- Refilling medical supplies.
- Recharging eyewashes and/or showers.
- Replenishing spill control supplies.

16.17 Documentation

Immediately following an incident or near miss, unless emergency medical treatment is required, either the employee or a coworker must contact the Langan Incident/Injury Hotline at 1-(800)-9-LANGAN (extension 4699) and the client representative to report the incident or near miss. For emergencies involving personnel injury and/or exposure, the HSO and affected employee will complete and submit an Employee Exposure/Injury Incident Report (Attachment C) to the Langan Corporate Construction Health and Safety Manager as soon as possible following the incident.

17.0 SPECIAL CONDITIONS

This guideline contains information and requirements for special conditions that may not be routinely encountered.

17.1 Scope

The guideline applies to the specific projects identified within this document. Additional provisions will be addressed in each Site-Specific Construction Health and Safety Plan (HASP), as needed.

17.2 Responsibilities

Site Personnel - All site personnel must be alert to safety hazards on work sites and take action to minimize such hazards. Personnel must utilize the buddy system, watch for inappropriate behavior, and be alerted to changes in site conditions.

Construction Health and Safety Officer (HSO) - The HSO is responsible for considering these procedures in the development of site-specific HASPs. The HSO must schedule frequent "tail gate" safety briefings to enhance safety awareness and discuss potential problems.

17.3 Procedures

The procedures outlined below must be followed when such conditions are encountered.

17.3.1 Ladders

Langan safety procedures must be used to ensure employee safety when using ladders in the office or work sites. All ladders must be coated or repaired to prevent injury to the employee from punctures or lacerations and to prevent snagging or clothing. Any wood ladders used must have an opaque covering except for identification or warning labels, which may be placed on one face only of a side rail.

17.3.1.1 Ladder Use

Employees must only use ladders for the purposes they were designed for and must not be used as scaffolding. Ladders will be maintained and inspected prior to use for slip hazards including oil and grease. Employees must use ladders only on stable and level surfaces unless the ladder is secured to prevent displacement. Ladders should not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Ladders should not be used in locations where they could be displaced by workplace activities or traffic. Ladder rungs, cleats and steps must be parallel, level and uniformly spaced when the ladder is in the use position.

Employees should not be carrying anything including equipment that could cause injury if there was a fall while utilizing the ladder. The top and bottom of the ladder area must remain clear while in use. When ascending and descending the ladder, employees must face the ladder.

Ladders must not be loaded beyond the maximum intended load for which they were built or the manufacturer's rated capacity.

17.3.1.2 Portable Ladders

Rungs, cleats, and steps for portable ladders and fixed ladders must be spaced not less than 10 inches apart, nor more than 14 inches apart, as measured between center lines of the rungs, cleats, and steps. When used to access an upper landing surface, the ladder side rails must extend at least three feet above the upper landing surface to which the ladder is used to gain access. If this is not possible, due to the length of the ladder, then the top of the ladder must be secured at its top to a rigid support.

17.3.1.3 Step Stools

Rungs, cleats, and steps of step stools must not be less than 8 inches apart, nor more than 12 inches apart, as measured between center lines of the rungs, cleats, and steps.

17.3.1.4 Extension Ladders

Rungs, cleats, and steps of the base section of extension trestle ladders must be spaced not less than 8 inches apart, nor more than 18 inches apart, as measured between center lines of the rungs, cleats, and steps. The rung spacing on the extension section of the extension trestle ladder must not be less than 6 inches nor more than 12 inches, as measured between the center lines of the rungs, cleats and steps. Ladders must be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support).

17.3.1.5 Inspection

Ladders will be inspected for visible detects periodically, prior to utilization or after any occurrence that could have negatively affected the ladder. Portable ladders with defects including broken or missing rungs, cleats, or steps, broken or split rails, corroded components, or other faulty components must not be used. The ladder will be immediately marked as defective, tagged as "Do Not Use" or blocked from being used and removed from service until repaired.

17.3.2 First Aid/Cardiopulmonary Resuscitation (CPR)

Langan field and office personnel will be encouraged to be trained in First Aid and Cardiopulmonary Resuscitation (CPR). Training will be provided free of charge by Langan to all employees. Employees will receive a training certificate that will be kept on file with the Health & Safety Coordinator (HSC). Training and certification will be provided by a credited provider such as American Red Cross or equivalent.

17.3.2.1 Emergency Procedures

Prior to site work, the Langan employees certified in first aid and CPR will be identified in the site-specific HASP. Langan will endear to have at least one employee at a job site trained and able to render first aid and CPR. The site-specific HASP will contain first aid information on both potential chemical and physical hazards. Emergency procedures to be followed in case of injury or illnesses are provided in the HASP. The HASP will include emergency contact information including local police and fire departments, hospital emergency rooms, ambulance services, on-site medical personnel, and physicians. The HASP will also include directions and contact information for the nearest emergency facility in case immediate medical attention is required.

The emergency contact information will be conspicuously posted at the worksite. Employees that are injured and require immediate medical attention must call either 911 or the local posted emergency contacts. Employees should use ambulatory services to transport injured workers to the nearest facility for emergency medical care. In areas where 911 is not available, the telephone numbers of physicians, hospitals, or ambulances must be conspicuously posted.

17.3.2.2 First Aid Supplies

First aid supplies are readily available to all Langan employees when required. First aid kits are in each Langan office. Portable first aid kits are available for employees to use at work sites. First aid kits should consist of items needed to treat employees for potential chemical and physical injuries. At a minimum, first aid kits should contain items to allow basic first aid to be rendered. Where the eyes or body of an employee may be exposed to corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body must be provided within the work area for immediate emergency use including eye wash.

First aid kits will be weatherproof with individually sealed packages of each item. All portable first aid kits must be inspected by Langan employees before and after use to ensure all used items are replaced. When out in the field, employees must check first aid kits weekly to ensure used items are replaced.

17.3.3 Hydrogen Sulfide

Langan employees with the potential to be exposed to hydrogen sulfide while at work sites must have training in hydrogen sulfide awareness. The training will include the identification of areas where employees could be exposed to hydrogen sulfide, health effects, permissible exposure limits, first aid procedures, and personnel protective equipment. Langan employees could be exposed to hydrogen sulfide while at job sites including petroleum refineries, hazardous waste treatment, storage and disposal facilities, uncontrolled hazardous waste sites, and remediation projects.

17.3.3.1 Characteristics

Hydrogen sulfide is a colorless gas with a strong odor of rotten eggs that is soluble in water. Hydrogen sulfide is used to test and make other chemicals. It is also found as a by-product of chemical reactions, such as in sewer treatment. It is a highly flammable gas and a dangerous fire hazard. Poisonous gases are produced in fires including sulfur oxides. Hydrogen sulfide is not listed as a carcinogen.

17.3.3.2 Health Effects

Hydrogen Sulfide can affect employees if inhaled or through contact with skin or eyes. Acute (or short-term) health effects of hydrogen sulfide exposure include irritation of the nose and throat, dizziness, confusion, headache, and trouble sleeping. Inhalation of hydrogen sulfide can irritate the lungs causing coughing and/or shortness of breath. Higher levels of exposure can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.

Chronic (or long-term) health effects of low levels of exposure to hydrogen sulfide can cause pain and redness of the eyes with blurred vision. Repeated exposure may cause bronchitis with cough, phlegm, and shortness of breath.

17.3.3.3 Protective Clothing and Equipment

Respirators are required for those operations in which employees will be exposed to hydrogen sulfide above OSHA permissible exposure level. The maximum OSHA permissible exposure limit (PEL) for hydrogen sulfide is 20 parts of hydrogen sulfide vapor per million parts of air (20 ppm) for an 8-hour workday and the maximum short-term exposure limit (STEL) is 10 ppm for any 10-minute period.

Where employees are exposed to levels up to 100 parts of hydrogen sulfide vapor per million parts of air (100 ppm), the following types of respiratory protection are allowed:

- Any powered, air-purifying respirator with cartridge(s).
- Any air-purifying, full-facepiece respirator (gas mask) with a chin style, front- or back-mounted canister.
- Any supplied air system with escape self-contained breathing apparatus, if applicable; and,
- Any self-contained breathing apparatus with a full facepiece.

Respirators used by employees must have joint Mine Safety and Health Administration and the National Institute for Occupational Safety and Health (NIOSH) seal of approval. Cartridges or canisters must be replaced before the end of their service life, or the end of the shift, whichever occurs first. Langan employees that have the potential to be exposed to hydrogen sulfide will be trained in the proper use of respirators. Respirator training is discussed under– Langan's Respiratory Protection Program.

Employees with potential exposure to hydrogen sulfide, or when required by the client, will wear a portable hydrogen sulfide gas detector. The detector should have an audible, visual, and vibrating alarm. The detector may also provide detection for carbon monoxide, sulfur dioxide,

and oxygen-deficient atmospheres. The hydrogen sulfide monitor will, at a minimum, be calibrated to detect hydrogen sulfide at a level of 20 parts of hydrogen sulfide vapor per million parts of air (20 ppm). Many portable gas detectors will have factory defaults with a low-level alarm at 10 ppm and a high-level alarm at 15 ppm. Langan employees must consult clients to determine if any site-specific threshold levels exist.

If the hydrogen sulfide gas detector sounds and employees are not wearing appropriate respiratory protection, employees must immediately vacate the area and meet at the assigned emergency location. Langan employees may not re- enter the site without proper respiratory protection and approval from the client or property owner if needed.

Employees must wear PPE to prevent eye and skin contact with hydrogen sulfide. Employees must wear appropriate protective clothing including boots, gloves, sleeves, and aprons, over any parts of their body that could be exposed to hydrogen sulfide. Non-vented, impact-resistant goggles should be worn when working with or exposed to hydrogen sulfide.

17.3.3.4 Emergency and First Aid Procedures

Eye and Face Exposure

If hydrogen sulfide comes in contact with eyes, it should be washed out immediately with large amounts of water for 30 minutes, occasionally lifting the lower and upper eye lids. Seek medical attention immediately.

Skin Exposure

If hydrogen sulfide contaminates clothing or skin, remove the contaminated clothing immediately and wash the exposed skin with large amounts of water and soap. Seek medical attention immediately. Contaminated clothing should either be disposed of or washed before wearing again.

Breathing

If a Langan employee or other personnel breathe in hydrogen sulfide, immediately get the exposed person to fresh air. If breathing has stopped, artificial respiration should be started. Call for medical assistance or a doctor as soon as possible.

Safety Precautions

Hydrogen sulfide is a highly flammable gas and a dangerous fire hazard. Containers of hydrogen sulfide may explode in a fire situation. Poisonous gases are produced during fires.

Langan employees should contact property owners and operators prior to conducting work onsite to be aware of any site-specific contingency plans, identify where hydrogen sulfide is used at the facility, and be informed about additional safety rules or procedures.

17.3.4 Fire Protection/Extinguishers

Langan field personnel that have been provided with portable fire extinguishers for use at worksites will be trained to familiarize employees with general principles of fire extinguisher use and hazards associated with the incipient stage of firefighting. Training will be provided prior to the initial assignment for field work and annually thereafter.

Portable fire extinguishers must be visually inspected monthly and subjected to an annual maintenance check. Langan will retain records of the annual maintenance date.

17.3.5 Overhead lines

When field work is performed near overhead lines, the lines must be de-energized and grounded, or other protective measures must be provided before the work commences. If overhead lines are to be de-energized, arrangements must be made with the client, property owner, or organization that operates or controls the electric circuits involved to de-energize and ground them. If protective measures, such as guarding, isolating, or insulating, are provided, these precautions must prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment.

When unqualified Langan personnel are working in an elevated position near overhead lines, the location must be such that the person and the longest conductive object they may contact cannot come closer to any unguarded, energized overhead line than the following distances:

1. For voltages to ground 50 kilovolts (kV) or below - 10 feet; and
2. For voltages to ground over 50kV - 10 feet, plus 4 inches for every 10kV over 50kV.

As previously indicated, Langan does not retain qualified employees to perform work on energized equipment.

17.3.5.1 Vehicle and Equipment Clearance

Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines must be operated so that a clearance of 10 feet is maintained. If the voltage of the overhead lines is higher than 50kV, the clearance must be increased by 4 inches for every 10kV over that voltage.

If any of the following discussed conditions occur, the clearance may be reduced.

- If the vehicle is in transit with its structure lowered, the clearance may be reduced to 4 ft. If the voltage is higher than 50kV, the clearance must be increased to 4 inches for every 10 kV over that voltage.
- If insulating barriers are installed to prevent contact with the lines, and if the barriers are rated for the voltage of the line being guarded and are not a part of or an attachment to the vehicle or its raised structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier.

Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments unless the employee is using protective equipment rated for the voltage, or the equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path to employees on the ground) can come closer to the overhead line than permitted.

If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of overhead line contact. Additional precautions, such as the use of barricades or insulation, must be taken to protect employees from hazardous ground potentials, depending on earth resistivity and fault currents, which can develop within the first few feet or more outward from the grounding point.

17.3.6 Trade Secret

Langan employees could potentially be provided trade secret information by the client or property owner when site-specific information is provided about highly hazardous chemicals. Trade secret means any confidential formula, pattern, process, device, information, or compilation of information that is used in an employer's business, and that allows the employer to obtain an advantage over competitors who do not know or use it. Langan employees understand that this information should be kept confident and if required, may enter into a confidentiality agreement with the client.

17.3.7 Bloodborne Pathogens

Langan employees that can anticipate exposure to blood or other potentially infectious material while at work sites must have training in bloodborne pathogens. Applicable employees would include those trained in first aid and serving a designated role as an emergency medical care provider. Bloodborne pathogens are pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include but are not limited to, hepatitis B virus and human immunodeficiency virus.

17.3.7.1 Training

Langan employees with potential occupational exposure to blood or other potentially infectious material must participate in a training program. Training must be conducted prior to the initial assignment where there would be potential for exposure and annually thereafter within one year of previous training. The training program will be provided to Langan employees at no cost to them and during working hours.

Langan will ensure the training program must consist of the following:

- An accessible copy of the regulatory text of 29 CFR 1910.1030 and an explanation of its contents.
- A general explanation of the epidemiology and symptoms of bloodborne diseases.
- An explanation of the modes of transmission of bloodborne pathogens.
- An explanation of Langan's exposure control plan and how the employee can obtain a copy of the written plan.
- An explanation of the appropriate methods for recognizing tasks and other activities that may involve exposure to blood and other potentially infectious materials.
- An explanation of the use and limitations of personal protective equipment (PPE) to prevent and reduce exposure.
- Information on the types, proper use, location, removal, handling, and disposal of PPE.
- An explanation of the basis for the selection of PPE.
- Information on the hepatitis B vaccine, including information on its efficacy, safety, method of administration, the benefits of being vaccinated, and that the vaccine and vaccination will be offered free of charge.
- Information on the appropriate actions to take and persons to contact in an emergency involving blood or other potentially infectious materials.
- An explanation of the procedure to follow if an exposure incident occurs, including the method of reporting the incident and the medical follow-up that will be made available.
- Information on the post-exposure evaluation and determining whether the employer is required to provide for the employee following an exposure incident.
- An explanation of the signs and labels and/or color coding required by paragraph 29 CFR 1910.1030(g)(1); and
- An opportunity for interactive questions and answers with the person conducting the training session.

Langan will develop and implement a written Exposure Control Plan, which will be designed to eliminate or minimize employee exposure to bloodborne pathogens. The Exposure Control Plan will contain the following elements:

- An exposure determination for employees.
- The schedule and method of implementation for Methods of Compliance (29 CFR 191.1030(d)), Hepatitis B Vaccination and Post-Exposure Evaluation and Follow-up (29 CFR 1910.1030(f)), Communication of Hazards to Employees (29 CFR 1910.1030(g)) and (h) Recordkeeping (29 CFR 1910.1030(h)).
- The procedure for the evaluation of circumstances surrounding exposure incidents.
- Ensure a copy of the Exposure Control Plan will be accessible to employees; and,
- The Exposure Control Plan must be reviewed and updated at least annually.

Langan employees with occupational exposure to bloodborne pathogens include any employees trained in first aid that would be expected to provide emergency medical care. This determination is made without regard to the use of PPE, which could eliminate or minimize exposure.

Universal precautions must be observed to prevent contact with blood or other potentially infectious materials. According to the concept of Universal Precautions, all human blood and certain human body fluids are treated as if known to be infectious for bloodborne pathogens. When differentiation between body fluid types is difficult or impossible, all body fluids must be considered potentially infectious materials.

Work practice controls must be used to eliminate or minimize employee exposure, if applicable. Since Langan employees will have occupational exposure only during the rendering of first aid, personnel protective equipment will be utilized to reduce or minimize exposure. PPE that could be available to Langan personnel when administering first aid includes safety glasses, gloves, and Tyvek suits or sleeves. PPE and first aid kits will be provided to employees at no cost to them.

Langan employees that render first aid in office areas will have access to hand-washing facilities or restrooms. For first aid rendered at field locations, first aid kits will contain an appropriate antiseptic hand cleanser and clean cloth/paper towels or antiseptic towelettes. After using antiseptic hand cleansers or towelettes, employees must wash their hands with soap and running water as soon as feasible.

After administering first aid, potentially infectious materials, including towels, personnel protective equipment, clothes, and bandages, must be placed in a container, which prevents leakage during collection, handling, processing, storage, transport, or shipping. All PPE will be disposed of after use. Any equipment or working surfaces which was been exposed to blood or potentially infectious materials due to an injury will be decontaminated prior to reuse.

Langan will make available the hepatitis B vaccine and vaccination series to all employees who have occupational exposure, and post-exposure evaluation and follow-up to all employees who

have had an exposure incident. These services will be available to the employee at no cost to them through a medical provider.

17.3.7.2 Recordkeeping

Langan will maintain training and medical records for each employee with occupational exposure to blood or potentially infectious materials. Medical and training records will be maintained by Langan's H&S Department.

Training records will include the following:

- Dates of the training sessions.
- Contents or a summary of the training sessions.
- Names and qualifications of persons conducting the training; and
- Names and job titles of all persons attending the training sessions.

Training records must be maintained for 3 years from the date on which the training occurred. Medical records will be preserved and maintained for the duration of employment plus 30 years.

All records will be made available upon request to employees, the Assistant Secretary of Labor for Occupational Safety and Health, and the Director of the National Institute for Occupational Safety and Health Director of OSHA for examination and copying. Medical records must have written consent from the employee before releasing.

If Langan ceases to do business, all records must be transferred to the successor employer. The successor employer must receive and maintain these records.

If there will not be a successor, Langan will notify current employees of their rights to access records at least three months prior to the cessation of business.

18.0 RECORDKEEPING

The following is a summary of required health and safety logs, reports, and recordkeeping.

18.1 Field Change Authorization Request

Any changes to the work to be performed that are not included in the HASP will require an addendum that is approved by the Langan project manager and Langan HSM to be prepared. Approved changes will be reviewed with all field personnel at a safety briefing.

18.2 Medical and Training Records

Copies or verification of training (40-hour, 8-hour, supervisor, site-specific training, documentation of three-day on-the-job training (OJT)), and respirator fit-test records) and medical clearance for site work and respirator use will be maintained in the office and available upon request. Records for all subcontractor employees must also be available upon request. All employee medical records will be maintained by the HSM.

18.3 Onsite Log

A log of personnel on-site each day will be kept by the HSO or designee.

18.4 Daily Safety Meetings ("Tailgate Talks")

Completed safety briefing forms (Attachment H) will be maintained by the HSO or FTL.

18.5 Exposure Records

All personal monitoring results, laboratory reports, calculations, and air sampling data sheets are part of an employee exposure record. These records will be maintained by the HSO during site work. At the end of the project, they will be maintained according to 29 CFR 1910.1020.

18.6 Hazard Communication Program - SDS

Safety Data Sheets (SDS) have been obtained for applicable substances and are included in this HASP (Attachment D). Langan's written hazard communication program, in compliance with 29 CFR 1910.1200, is maintained by the HSM.

18.7 Documentation

Immediately following an incident or near miss, unless emergency medical treatment is required, either the employee or a coworker must contact the Langan incident/injury hotline at 973-560-4699, and the Project Manager to report the incident or near miss. The Project Manager will contact the client or client representative. A written report must be completed and submitted HSM within 24 hours of the incident. For emergencies involving personnel injury and/or exposure, the employee will complete and submit the Langan incident/injury report to the Langan corporate health and safety manager as soon as possible following the incident. Accidents will be investigated in-depth to identify all causes and to recommend hazard control measures.

18.7.1 Accident and Injury Report Forms

18.7.1.1 Accident/Incident Report

All injuries, no matter how slight, must be reported to the FTL and the PM immediately. The accident/incident report forms, attached in Attachment C, will be filled out on all accidents by the applicable contractor supervision personnel, the FTL, or the HSO. Copies of all accident/incident reports must be kept on-site and available for review. Project personnel will be instructed on the location of the first aid station, hospital, and doctor and ambulance service near the job. The emergency telephone numbers will be conspicuously posted in site vehicles near the work zone. First aid supplies will be centrally located and conspicuously posted between restricted and nonrestricted areas to be readily accessible to all on the site.

18.7.1.2 First Aid Treatment Record

The forms will be used for recording all non-lost time injuries treated by the project first-aid attendant, the local physician or hospital will be entered in detail on this record. "Minor" treatment of scratches, cuts, etc. will receive the same recording attention as treatment of more severe injuries.

18.7.1.3 OSHA Form 300

An OSHA Form 300 will be kept at the Langan Corporate Office in Parsippany, New Jersey. All recordable injuries or illnesses will be recorded on this form. Subcontractor employers must also meet the requirements of maintaining an OSHA 300 form. The Incident Report form used to capture the details of work-related injuries/illnesses meets the requirements of the OSHA Form 301 (supplemental record) and must be maintained with the OSHA Form 300 for all recordable injuries or illnesses. Forms for recording OSHA work-related injuries and illnesses are included in Attachment C.

19.0 CONFINED SPACE ENTRY

Confined spaces are not anticipated at the Site during planned activities. If confined spaces are identified, the contractor must implement their own confined space program that all applicable federal, state, and local regulations. Confined spaces **will not** be entered by Langan personnel.

20.0 HASP ACKNOWLEDGEMENT FORM

All Langan personnel and contractors will sign this HASP Compliance Agreement indicating that they have become familiar with this HASP and that they understand it and agree to abide by it.

Printed Name	Signature	Company	Date

TABLES

TABLE 1
TASK HAZARD ANALYSES

Task	Hazard	Description	Control Measures	First Aid
1.3.1 – 1.3.18	Contaminated Soil or Groundwater- Dermal Contact	Contaminated water spills on skin, splashes in eyes; contact with contaminated soil/fill during activities or sampling.	Wear proper PPE; follow safe practices, maintain safe distance from activities	See Table 2, seek medical attention as required
1.3.1 – 1.3.18	Lacerations, abrasions, punctures	Cutting bailer twine, pump tubing, acetate liners, etc. with knife; cuts from sharp site objects or previously cut piles, tanks, etc.; Using tools in tight spaces	Wear proper PPE; follow safe practices	Clean wound, apply pressure and/or bandages; seek medical attention as required.
1.3.1 – 1.3.18	Contaminated Media Inhalation	Opening drums, tanks, wells; vapors for non-aqueous phase liquids or other contaminated site media; dust inhalation during excavation; vapor accumulation in excavation	Follow air monitoring plan; have quick access to respirator, do not move or open unlabeled drums found at the site, maintain safe distance from activities	See Table 2, seek medical attention as required
1.3.1 – 1.3.18	Lifting	Improper lifting/carrying of equipment and materials causing strains	Follow safe lifting techniques. Langan employees are not to carry contractor equipment or materials	Rest, ice, compression, elevation; seek medical attention as required
1.3.1 – 1.3.18	Slips, trips, and falls	Slips, trips, and falls due to uneven surfaces, cords, steep slopes, debris, and equipment in work areas	Good housekeeping at site; constant awareness and focus on the task; avoid climbing on stockpiles; maintain safe distance from activities and excavations; avoid elevated areas over six feet unless fully accredited in fall protection and wearing an approved fall protection safety apparatus	Rest, ice, compression, elevation; seek medical attention as required
1.3.1 – 1.3.18	Noise	Excavation equipment, hand tools, drilling equipment.	Wear hearing protection; maintain safe distance from activities	Seek medical attention as required
1.3.1 – 1.3.18	Falling objects	Soil material, tools, etc. dropping from drill rigs, front-end loaders, etc.	Hard hats to be worn at all times while in work zones; maintain safe distance from activities and excavations	Seek medical attention as required
1.3.1 – 1.3.18	Underground/ overhead utilities	Excavation equipment, drill rig auger contacts underground object; boom touches overhead utility	"One Call" before dig; follow safe practices; confirm utility locations with contractor; wear proper PPE; maintain safe distance from activities and excavations	Seek medical attention as required
1.3.1 – 1.3.18	Insects (bees, wasps, hornet, mosquitoes, and spider)	Sings, bites	Insect Repellent; wear proper protective clothing (work boots, socks, and light-colored pants); field personnel who may have insect allergies (e.g., bee sting) should provide this information to the HSO or FSO prior to commencing work and will have allergy medication on site.	Seek medical attention as required
1.3.1 – 1.3.18	Vehicle traffic / Heavy Equipment Operation	Vehicles unable to see workers on site, operation of heavy equipment in tight spaces, equipment failure, malfunctioning alarms	Wear proper PPE, especially visibility vest; use a buddy system to look for traffic; rope off area of work with cones and caution tape or devices at points of hazard, maintain safe distance from activities and equipment	Seek medical attention as required

TABLE 2
CONTAMINANT HAZARDS OF CONCERN

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	1,1'-Biphenyl 1,1-Biphenyl Biphenyl Phenyl benzene Diphenyl	92-52-4	None	1 mg/m^3 100 mg/m^3	Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, throat; headache, nausea, lassitude (weakness, exhaustion), numb limbs; liver damage	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	1,1-Dichloroethane Asymmetrical dichloroethane Ethylidene chloride 1,1-Ethylidene dichloride 1,1-DCA	75-34-3	PID	100 ppm 3000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the skin; central nervous system depression; liver, kidney, lung damage	Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	1,2,4,5-Tetramethylbenzene Durene	95-93-2	NA	None None	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	1,2,4-Trimethylbenzene	95-63-6	PID	None None	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	1,2-Dichlorobenzene o-DCB	95-50-1	PID	50 ppm 200 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eye, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	1,2-Dichloroethane Ethylene dichloride 1,2-DCA DCE[1] Ethane dichloride Dutch liquid, Dutch oil Freon 150 Glycol dichloride	107-06-2	PID	1 ppm 50 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin absorption, skin, and/or eye contact	irritation to the eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	1,2-Dichloroethene 1,2-Dichloroethylene 1,2-DCE trans-1,2-Dichloroethylene Total 1,2-Dichloroethene cis-1,2-Dichloroethylene mixture of cis and trans Acetylene dichloride cis-Acetylene dichloride sym-Dichloroethylene cis-1,2-Dichloroethene cDCE 1,1-dimethyl-;dimethyl1,1-cyclohexane sym-Dichloroethylene Dichloroethylenes trans-1 2-Dichloroethene Total 1,2-Dichloroethene (Cis and Trans)	159-59-2 156-60-5 156-60-2 540-59-0	PID	200 ppm 4000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	Irritant to eyes, skin, mucous membranes, and respiratory system. May be harmful by ingestion, skin absorption and inhalation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	1,2-Dichlorotetrafluoroethane Dichlorotetrafluorethane 1,2-Dichloro-1,1,2,2-tetrafluoroethane Freon® 114 Freon 114 Genetron® 114 Halon® 242 Refrigerant 114 1,2-Dichloro-1,1,2,2-tetrafluorethane	76-14-2	PID	1000 ppm 15000 ppm	Groundwater Soil Vapor	inhalation, skin, and/or eye contact (liquid)	irritation respiratory system; asphyxia; cardiac arrhythmias, cardiac arrest; liquid: frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	1,3,5-Trimethylbenzene Mesitylene sym-Trimethylbenzene	108-67-8	PID	None None	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	1,3-Butadiene Biethylene Bivinyl Butadiene Divinyl Erythrene Vinylethylene	106-99-0	PID	1 ppm 2000 ppm	Vapor	inhalation, skin, and/or eye contact (liquid)	irritation to the eyes, nose, throat; drowsiness, dizziness; liquid: frostbite; teratogenic, reproductive effects; [potential occupational carcinogen]	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support
1.3.1 – 1.3.18	1,3-Dichlorobenzene m-Dichlorobenzol; m-Phenylene dichloride m-dichlorobenzene m-DCB	541-73-1	PID	None None	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	1,4-Dichlorobenzene para-Dichlorobenzene p-Dichlorobenzene 1,4-Dichlorobenzene 1,4-DCB para-Dichlorobenzene p-Dichlorobenzene p-DCB PDB Paramoth Para crystals Paracide Dichlorocide	106-46-7	PID	75 ppm 150 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	1,4-Dioxane 1,4-Dioxacyclohexane [1,4]Dioxane p-Dioxane [6]-crown-2 Diethylene dioxide Diethylene ether Dioxan Dioxane 1,4-Dioxane	123-91-1	PID	100 ppm 500 ppm	Groundwater Soil Vapor	Inhalation, ingestion, skin, and/or eye contact	Irritant to eyes, skin, mucous membranes, and respiratory system. May be harmful by ingestion, skin absorption and inhalation	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	1H,1H,2H,2H.Perfluorodecane sulfonic Acid (8:2FTS) 8:2 Fluorinated Telomer Sulfonates (8:2FTS) 1H,1H,2H,2H-Perfluorodecane Sulfonic Acid (8:2FTS)	27619-96-1	NA	NA NA	Groundwater	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	1H,1H,2H,2H-Perfluorooctane Sulfonic Acid 1H,1H,2H,2H-Perfluorooctane Sulfonic Acid (6:2FTS) 1,1,2,2-Tetrahydroperfluorooctane sulfonate 1H,1H,2H,2H-Perfluorooctanesulfonic acid, 2-(Perfluorohexyl)ethane-1-sulfonic acid 2-(Perfluorohexyl)ethanesulfonic acid 3,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluorooctane-1-sulfonic acid 3,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluorooctanesulfonic acid THPFOS PFC 6:2 Fluorotelomer Sulfonic Acid, 6:2 FTS,H4PFOS 6:2 FTSA, 3,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluoro-1-octanesulfonic acid	27619-97-2	NA	None None	Groundwater Soil	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	2-(N-Methylperfluorooctanesulfonamido)acetic acid N-MeFOSAA N-methylperfluorooctane sulfonamidoacetic acid 2-(N-methyl-perfluorooctane sulfonamido) acetic acid Glycine N-[(heptadecafluorooctyl)sulfonyl]-N-methyl- N-methyl perfluorooctane-sulfonamidoacetic acid NMeFOSAA MeFOSAA	2355-31-9	NA	NA NA	Groundwater Soil	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	2,2,4-Trimethylpentane 2,2-Dimethylbutane 2,3-Dimethylbutane Triptane Tetramethylbutane Tetraethylmethane 2,3,3-Trimethylpentane 2,3,4-Trimethylpentane Tetra-tert-butylmethane 2,3-Dimethylhexane 2,5-Dimethylhexane	540-84-1	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty);	Get Immediate Medical Attention Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Do Not Induce Vomiting
1.3.1 – 1.3.18	2,4-Dimethylphenol 2,4-Xylenol m-Xylenol 1-Hydroxy-2,4-dimethylbenzene 2,4-Dimethylphenol 4-Hydroxy-1,3-dimethylbenzene 4,6-Dimethylphenol 1,3-Dimethyl-4-hydroxybenze	105-67-9	None	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, mucous membrane; headache, narcosis, coma; dermatitis; in animals: liver, kidney damage	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	2-Butanone Ethyl methyl ketone MEK Methyl acetone Methyl ethyl ketone	78-93-3	PID	200 ppm 3000 ppm	Soil Groundwater Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose; headache; dizziness; vomiting; dermatitis	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.18	2-Hexanone Butyl methyl ketone MBK Methyl butyl ketone Methyl n-butyl ketone	591-78-6	PID	100 ppm 1600 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, nose; peripheral neuropathy: lassitude (weakness, exhaustion), paresthesia; dermatitis; headache, drowsiness	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	2-Methylnaphthalene β-methylnaphthalene	91-57-6	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion or skin, absorption, eye contact	irritation to the skin, eyes, mucous membranes, and upper respiratory tract. It may also cause headaches, nausea, vomiting, diarrhea, anemia, jaundice, euphoria, dermatitis, visual disturbances, convulsions and comatose	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	4,4′-DDD Dichlorodiphenyldichloroethane 1,1'-(2,2-Dichloroethylidene)bis (4-chlorobenzene) p,p'-DDD	72-54-8	None	NA NA	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	4-Chlorotoluene p-Chlorotoluene 1-Chloro-4-methylbenzene p-Tolyl chloride	106-43-4	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation eyes, skin, mucous membrane; dermatitis; drowsiness, incoordination, anesthesia; cough; liver, kidney injury	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	4-Isopropyltoulene 1-Methyl-4-(1-methylethyl)benzene 4-Isopropyltoluene; 4-Methylcumene; 1-Methyl-4-isopropylbenzene Dolcymene Camphogen Paracymene Cymene p-Cymene p-Isopropyltoluene	99-87-6	PID	NA NA	Soil Groundwater Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	4-Methyl-2-pentanone Hexone Isobutyl methyl ketone Methyl isobutyl ketone MIBK	108-10-1	PID	100 ppm 500 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, mucous membrane; headache, narcosis, coma; dermatitis; in animals: liver, kidney damage	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Acenaphthene 1,2-Dihydroacenaphthylene 1,8-Ethylenenaphthalene peri-Ethylenenaphthalene Naphthyleneethylene Tricyclododecapentaene	83-32-9	PID	NA NA	Soil	inhalation, ingestion, skin, and/or eye contact,	irritation to the skin, eyes, mucous membranes, and upper respiratory tract; If ingested, it can cause vomiting	Eye: Irrigate immediately Skin: Soap wash immediately, if redness or irritation develop, seek medical attention immediately Breathing: Move to fresh air Swallow: do not induce vomiting, seek medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Acenaphthylene Cycopental(de)naphthalene, Acenaphthalene	208-96-8	PID	NA NA	Soil	inhalation, ingestion, skin, and/or eye contact	irritation to the skin, eyes, mucous membranes, and upper respiratory tract	Eye: Irrigate immediately, seek medical attention immediately, Skin: Soap wash immediately, if redness or irritation develop, seek medical attention immediately Breathing: Move to fresh air Swallow: do not induce vomiting, seek medical attention immediately
1.3.1 – 1.3.18	Acetone Dimethyl ketone Ketone propane 2-Propanone 3-Hexen-2-one	67-64-1	PID	1000 ppm 2500 ppm	Groundwater Soil	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Aldrin 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-endo-1,4-exo-5,8-dimethanonaphthalene HHDN Octalene	309-00-2	PID	0.25 ppm 5 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort); myoclonic jerks of limbs; colonic, tonic convulsions; coma; hematuria (blood in the urine), azotemia; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Alpha-BHC alpha-Hexachlorocyclohexane -alpha,2-alpha,3-beta,4-alpha,5-beta,6-beta-Hexachlorocyclohexane alpha-1,2,3,4,5,6-Hexachlorocyclohexane alpha-Benzenehexachloride α-1,2,3,4,5,6-hexachlorocyclohexane α-HCH α-Benzenehexachloride alpha-hexacloran(e) alpha-Lindane Alpha Hexachlorocyclohexane	319-84-6	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, mucous membrane possible carcinogenic, effects to liver, blood, and central nervous system	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Alpha-Chlordane Alpha Chlordane a-Chlordane	5103-71-9	None	0.5 mg/m^3 100 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	Blurred vision; confusion; ataxia, delirium; cough; abdominal pain, nausea, vomiting, diarrhea; irritability, tremor, convulsions; anuria	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Aluminum	7429-90-5	None	0.5 mg/m3 50 mg/m3	Soil	inhalation, skin, and/or eye contact	irritation to the eyes, skin, respiratory system	Eye: Irrigate immediately Breathing: Fresh air
1.3.1 – 1.3.18	Anthracene	120-12-7	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin, or eye contact, ingestion	irritation to the skin, eyes, mucous membranes, and upper respiratory tract, abdominal pain if ingested.	Eye: Irrigate immediately, seek medical attention immediately, Skin: Soap wash immediately, Breathing: Move to fresh air, refer to medical attention. Swallow: refer to medical attention

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Antimony	7440-36-0	None	0.5 mg/m^3 50 mg/m^3	Groundwater Soil	inhalation, ingestion, skin, and/or eye contact	irritation skin, dermatitis; resp distress; diarrhea; muscle tremor, convulsions; possible gastrointestinal tract	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Aroclor 1254	11097-69-1	None	0.5 mg/m^3 5 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, chloracne	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Aroclor 1260	11096-82-5	None	0.5 mg/m^3 5 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, chloracne	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Aroclor 1268	11100-14-4	None	0.5 mg/m^3 5 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, chloracne	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Arsenic	NA	None	0.5 mg/m^3 NA	Groundwater Soil	inhalation, ingestion, skin, and/or eye contact	irritation skin, dermatitis; resp distress; diarrhea; muscle tremor, convulsions; possible gastrointestinal tract	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Barium	10022-31-8	None	0.5 mg/m^3 50 mg/m^3	Groundwater Soil	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, upper respiratory system; skin, burns; gastroenteritis; muscle spasm; slow pulse	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Benzene Benzol Phenyl hydride Alkyl benzene isomers	71-43-2	PID	3.19 mg/m^3 1,595 mg/mg^3	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; lassitude (weakness, exhaustion) [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Benzo(a)anthracene Benzanthracene Benzanthrene 1,2-Benzanthracene Benzo[b]phenanthrene Tetraphene	56-55-3	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, skin, or eye contact, ingestion	dermatitis, bronchitis, [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Benzo(a)pyrene	50-32-8	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin, or eye contact, ingestion	dermatitis, bronchitis, [potential occupational carcinogen]	Eye: Irrigate immediately, seek medical attention Skin: Soap wash immediately. Breathing: move to fresh air. Swallow: Induce vomiting if conscious, seek medical attention immediately
1.3.1 – 1.3.18	Benzo(b)fluoranthene	205-99-2	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin, or eye contact, ingestion	irritation to eyes and skin, respiratory irritation (dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.18	Benzo(g,h,i)fluoranthene Benzo[ghi]fluoranthene 203-12-3 BENZO(GHI)FLUORANTHENE pentacyclo[8.8.0.02,7.03,17.013,18]octadeca-1(10),2(7),3,5,8,11,13(18),14,16-nonaene 2,13-Benzofuranthene 2,13-Benzofluoranthene	203-12-3	NA	NA NA	Soil	inhalation, skin, or eye contact, ingestion	dermatitis, bronchitis, [potential occupational carcinogen]	Eye: Irrigate immediately, seek medical attention Skin: Soap wash immediately. Breathing: move to fresh air. Swallow: Induce vomiting if conscious, seek medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Benzo(g,h,i)perylene Benzo(ghi)perylene	191-24-2	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin, or eye contact, ingestion	irritation to eyes and skin, respiratory irritation (dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.18	Benzo(k)fluoranthene	207-08-9	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin, or eye contact, ingestion	irritation to eyes and skin, respiratory irritation (dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.18	Benzoic acid Carboxybenzene E210 Dracylic acid Phenylmethanoic acid Benzenecarboxylic acid Benzoic acid isomer	65-85-0	None	NA NA	Groundwater Soil Vapor	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air
1.3.1 – 1.3.18	Benzyl Alcohol Benzenemethanol Phenyl carbinol alpha-Hydroxytoluene Benzoyl alcohol Phenyl methanol	100-51-6	PID	NA NA	Groundwater Soil Vapor	inhalation, skin, or eye contact, ingestion	irritation to eyes and skin, respiratory irritation (dizziness, weakness, fatigue, nausea, headache	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Benzyl butyl phthalate Butyl benzyl phthalate Butylbenzylphthalate	86-66-7	None	NA NA	Groundwater Soil Vapor	inhalation, skin, or eye contact, ingestion	irritation to eyes and skin, respiratory irritation (dizziness, weakness, fatigue, nausea, headache	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.18	Beryllium	7440-41-7	None	0.002 mg/m^3 4 mg/m^3	Soil	inhalation, skin, and/or eye contact	berylliosis (chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation to the eyes; dermatitis; [potential occupational carcinogen]	Eye: Irrigate immediately Breathing: Fresh air
1.3.1 – 1.3.18	Beta BHC Beta Hexachlorocyclohexane 1-alpha,2-beta,3-alpha,4-beta,5-alpha,6-beta-Hexachlorocyclohexane beta-1,2,3,4,5,6-Hexachlorocyclohexane Beta-BHC	319-85-7	None	NA NA	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Beta-Endosulfan Beta Endosulfan Endosulfan II (beta) Endosulfan II	33213-65-9	None	None	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation skin; nausea, confusion, agitation, flushing, dry mouth, tremor, convulsions, headache; in animals: kidney, liver injury; decreased testis weight
1.3.1 – 1.3.18	Bis(2-ethylhexyl)phthalate Bis(2-Ethylhexyl) Phthalate Di-sec octyl phthalate DEHP Di(2-ethylhexyl)phthalate Octyl phthalate bis(2-ethylexyl)phthalate	117-81-7	None	5 mg/m^3 5000 mg/m^3	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, mucous membrane; in animals: liver damage; teratogenic effects; [potential occupational carcinogen	Eye: Irrigate immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	BTEX Benzene, Toluene, Ethylbenzene M-Xylene, O-Xylene And P-Xylene; BTEX I; BTEX II; BTEX Mixture I; BTEX Mixture II; BTEX Stock Standard Total BTEX	NA	PID	3.19 mg/m^3 1,595 mg/mg^3	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; lassitude (weakness, exhaustion) [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Cadmium	7440-43-9	None	0.005 mg/m^3 9 mg/m^3	Soil	inhalation, ingestion	pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Calcium	7440-70-2	None	NA	Groundwater Soil	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, upper resp tract; ulcer, perforation nasal septum; pneumonitis; dermatitis	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Carbazole 9-azafluorene Dibenzopyrrole Diphenylenimine diphenyleneimide	86-74-8	None	NA NA	Soil	inhalation, skin absorption (liquid), skin, and/or eye contact	irritation to eyes and skin, respiratory irritation	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Carbon disulfide	75-15-0	PID	20 ppm 500 ppm	Soil Groundwater Vapor	inhalation, skin, or eye contact, ingestion	irritation to the eyes, skin, respiratory system	Eye: Irrigate immediately (liquid) Skin: Water flush immediately (liquid) Breathing: Respiratory support
1.3.1 – 1.3.18	Carbon tetrachloride Carbon chloride Carbon tet Freon® 10 Halon® 104 Tetrachloromethane	56-23-5	PID	10 ppm 200 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin; central nervous system depression; nausea, vomiting; liver, kidney injury; drowsiness, dizziness, incoordination; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Chlorobenzene benzene chloride monochlorobenzene Phenyl chloride Chlorobenzol MCB	108-90-7	PID	75 ppm 1000 ppm	Groundwater Soil Vapor	inhalation, skin, or eye contact, ingestion	irritation to the eyes, skin, nose; drowsiness, incoordination; central nervous system depression; in animals: liver, lung, kidney injury	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Chloroethane Ethyl chloride, Monochloroethane Chlorene Muriatic ether EtCl UN 1037 Hydrochloric ether	75-00-3	PID	1000 ppm 38000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation eyes, skin, throat; confusion, dizziness, central nervous system depression; pulmonary edema	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Chloroform Methane trichloride Trichloromethane Chloro-3-methyl phenol	67-66-3	None	50 ppm 500 ppm	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin; dizziness, mental dullness, nausea, confusion; headache, lassitude (weakness, exhaustion); anesthesia; enlarged liver; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Chromium Total Chromium Chromium, Total	7440-47-3	None	1.0 mg/m^3 250 mg/m^3	Groundwater Soil	inhalation absorption ingestion	irritation to eye, skin, and respiratory	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Chrysene Benzo[a]phenanthrene 1,2-Benzphenanthrene	218-01-9	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, absorption, ingestion, consumption	irritation to eye, skin, and respiratory, gastrointestinal irritation nausea, vomit, diarrhea [potential occupational carcinogen]	Eyes: Irrigate immediately Skin: Soap wash promptly. Breath: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	cis-1,2-Dichloroethylene cis-1,2-Dichloroethene	156-59-2	NA	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	Irritant to eyes, skin, mucous membranes, and respiratory system. May be harmful by ingestion, skin absorption and inhalation	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Cobalt	7440-48-4	None	0.1mg/m^3 20 mg/m^3	Soil	inhalation, ingestion, skin, and/or eye contact	Cough, dyspnea (breathing difficulty), wheezing, decreased pulmonary function; weight loss; dermatitis; diffuse nodular fibrosis; resp hypersensitivity, asthma	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Copper	7440-50-8	None	1.0 mg/m^3 100 mg/m^3	Groundwater Soil	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, nose, metallic taste; dermatitis; anemia	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Cumene Cumol Isopropylbenzene 2-Phenyl propane 1-methylethy lbenzene Isopropyl Benzene	98-82-8	PID	50 ppm 900 ppm	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Cyanide	57-12-5	None	5 mg/m^3 25 mg/m^3	Groundwater Soil	inhalation, ingestion, skin, and/or eye contact	Exposure to cyanide can cause weakness, headaches, confusion, dizziness, fatigue, anxiety, sleepiness, nausea and vomiting. Breathing can speed up then become slow and gasping. Coma, and convulsions also occur. If copious amounts of cyanide have been absorbed by the body, the person usually collapses, and death can occur very quickly. Long-term exposure to lower levels of cyanide can cause skin, and nose irritation, itching, rashes and thyroid changes.	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Cyclohexane Benzene hexahydride Hexahydrobenzene Hexamethylene Hexanaphthene	110-82-7	PID	300 ppm 1300 ppm	Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, respiratory system; drowsiness; dermatitis; narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	DDE 4,4-DDE 4,4′-DDE 1,1-bis-(4-chlorophenyl)-2,2-dichloroethene Dichlorodiphenyldichloroethylene p,p'-DDE	72-55-9	None	NA NA	Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	Oral ingestion of food is the primary source of exposure for the general population. Acute and chronic ingestion may cause nausea, vomiting, diarrhea, stomach pain, headache, dizziness, disorientation, tingling, sensation, kidney damage, liver damage, convulsions, coma, and death. 4,4' DDE may cross the placenta and can be excreted in breast milk	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	DDT 4,4-DDT 4,4′-DDT p,p′-DDT Dichlorodiphenyltrichloroethane 1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane	50-29-3	None	1 mg/m^3 500 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Delta BHC Delta-BHC Delta-hexachlorocyclohexane Delta Hexachlorocyclohexane	319-86-8	None	0.5 mg/m^3 50 mg/m^3	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, throat; headache; nausea; colonic convulsions; resp difficulty; cyanosis; aplastic anemia; muscle spasm; in animals: liver, kidney damage	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Dibenz(a,h)anthracene Dibenzo(a,h)anthracene Dibenzo[a,h]anthracene	53-70-3	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, absorption, ingestion, consumption	irritation to eyes, skin, respiratory, and digestion [potential occupational carcinogen]	Eyes: Irrigate immediately Skin: Soap wash promptly. Breath: Respiratory support PID Swallow: Medical attention immediately
1.3.1 – 1.3.18	Dibenzofuran	132-64-9	None	NA NA	Soil	inhalation, absorption	irritation to eyes, and skin	Eyes: Irrigate immediately Skin: Soap wash promptly.
1.3.1 – 1.3.18	Dibutyl phthalate Di-n-butyl phthalate Butyl phthalate n-Butyl phthalate 1,2-Benzenedicarboxylic acid dibutyl ester o-Benzenedicarboxylic acid dibutyl ester DBP Palatinol C, Elaol Dibutyl-1,2-benzene-dicarboxylate Di-n-butylphthalate	84-74-2	None	5 mg/m^3 4000 mg/m^3	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, upper respiratory system, stomach	Eye: Irrigate immediately Skin: Wash regularly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Dichlorodifluoromethane Difluorodichloromethane, Fluorocarbon 12 Freon 12 Freon® 12 Genetron® 12 Halon® 122 Propellant 12 Refrigerant 12 Dichlorodifluromethane	75-71-8	None	1000 pp, 15,000 ppm	Groundwater Soil Vapor	inhalation, skin, and/or eye contact (liquid)	dizziness, tremor, asphyxia, unconsciousness, cardiac arrhythmias, cardiac arrest; liquid: frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Dieldrin HEOD 1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo exo-5,8-dimethanonaphthalene	60-57-1	PID	0.25 mg/m^3 50 mg/m^3	Groundwater Soil Water	inhalation, skin absorption, ingestion, skin, and/or eye contact	headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort), sweating; myoclonic limb jerks; colonic, tonic convulsions; coma; [potential occupational carcinogen]; in animals: liver, kidney damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Diesel Fuel automotive diesel fuel oil No. 2 distillate diesoline diesel oil diesel oil light diesel oil No. 1-D summer diesel	68334-30-5	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Di-n-octyl phthalate Di-n-cotylphthalate Di-n-octylphthalate Di-sec octyl phthalate Dioctyl phthalate DEHP, Di(2-ethylhexyl)phthalate, DOP, bis-(2-Ethylhexyl)phthalate, Octyl phthalate	117-84-0	None	5 mg/m^3 5000 mg/m^3	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, mucous membrane; in animals: liver damage; teratogenic effects; [potential occupational carcinogen]	Eye: Irrigate immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Endosulfan I Alpha Endosulfan	959-98-8	None	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation skin; nausea, confusion, agitation, flushing, dry mouth, tremor, convulsions, headache; in animals: kidney, liver injury; decreased testis weight	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Endosulfan sulfate 1,4,5,6,7,7-Hexachloro-5-norbornene-2,3-dimethanol, cyclic sulfate 6,7,8,9,10,10-hexachloro01,5,5a,9,9a-hexahydro-6,9-methano-2,4,3-benzodioxathiepin-3,3-dioxide	1031-07-8	None	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	Hypersensitive to stimulation, sensation of prickling, tingling, or creeping on skin. Headache, dizziness, nausea, vomiting, incoordination, tremor, mental confusion, hyperexcitable state. In severe cases: convulsions, seizures, coma, and respiratory depression.	Eye: Irrigate immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Endrin 1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo,endo-5,8-dimethanonaphthalene; Hexadrin	72-20-8	None	0.1 mg/m^3 2 mg/m^3	Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	epileptiform convulsions; stupor, headache, dizziness; abdominal discomfort, nausea, vomiting; insomnia; aggressiveness, confusion; drowsiness, lassitude (weakness, exhaustion); anorexia; in animals: liver damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Ethanol Absolute alcohol Alcohol cologne spirit drinking alcohol ethane monoxide ethylic alcohol EtOH ethyl alcohol ethyl hydrate ethyl hydroxide ethylol grain alcohol hydroxyethane methylcarbinol	64-17-5	PID	1000 ppm 3300 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose; headache, drowsiness, lassitude (weakness, exhaustion), narcosis; cough; liver damage; anemia; reproductive, teratogenic effects	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.18	Ethyl acetate Acetic ester Acetic ether Ethyl ester of acetic acid Ethyl ethanoate	141-78-6	PID	400 ppm 2000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation eyes, skin, nose, throat; narcosis; dermatitis	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Ethyl benzene Ethylbenzene Ethylbenzol Phenylethane	100-41-4	PID	435 mg/m^3 3,472 mg/m^3	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Ethyl ether Diethyl ether Diethyl oxide Ethyl oxide Ether Solvent ether	60-29-7	PID	400 ppm 1900 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, upper respiratory system; dizziness, drowsiness, headache, excited, narcosis; nausea, vomiting	Eye: Irrigate immediately Skin: Water wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Fluoranthene Benzo(j,k)fluorene	206-44-0	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, skin, or eye contact, ingestion	irritation to eyes and skin, respiratory irritation (dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.18	Fluorene	86-73-7	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin, or eye contact, ingestion	irritation to eyes and skin, respiratory irritation (dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Fuel Oil No. 2	68476-30-2	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	gamma-Chlordane Gamma Chlordane y-Chlordane	5566-34-7	None	0.5 mg/m^3 100 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	Blurred vision; confusion; ataxia, delirium; cough; abdominal pain, nausea, vomiting, diarrhea; irritability, tremor, convulsions; anuria	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Gasoline	8006-61-9	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, mucous membrane; dermatitis; headache, lassitude (weakness, exhaustion), blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Helium	7440-59-7	Helium Detector	NA NA	NA	inhalation	dizziness, headache, and nausea	Breathing: Respiratory support

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Heptane n-Heptane	142-82-5	PID	500 ppm 750 ppm	Goundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	dizziness, stupor, incoordination; loss of appetite, nausea; dermatitis; chemical pneumonitis (aspiration liquid); unconsciousness	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Hexachlorobenzene Perchlorobenzene Pentachlorophenylchloride Benzene hexachloride Phenyl perchloryl HCB BHC	118-74-1	NA	NA NA	Groundwater Soil	inhalation, ingestion, skin, and/or eye contact	Irritating to eyes, skin, and mucous membranes. Prolonged periods of ingestion may cause cutaneous porphyria	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Hexavalent Chromium Chromium VI Chromium, Hexavalent	18540-29-9	None	1.0 mg/m^3 250 mg/m^3	Groundwater Soil	inhalation absorption ingestion	irritation to eye, skin, and respiratory	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Indeno(1,2,3-cd)pyrene Indeno(1,2,3-c,d)Pyrene Indeno[1,2,3-cd]Pyrene	193-39-5	None	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, absorption, ingestion, consumption	irritation to eyes, skin, respiratory, and digestion [potential occupational carcinogen]	Eyes: Irrigate immediately Skin: Soap wash promptly. Breath: Respiratory support Swallow: Medical attention immediately, wash mouth with water

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Iron	7439-89-6	None	10 mg/m^3 NA	Groundwater Soil	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, mucous membrane; abdominal pain, diarrhea, vomiting	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Isopropyl alcohol Iso-Propyl Alcohol Carbinol IPA Isopropanol 2-Propanol sec-Propyl alcohol Rubbing alcohol Isopropylalcohol	67-63-0	PID	400 ppm 2000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, nose, throat; drowsiness, dizziness, headache; dry cracking skin; in animals: narcosis	Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Lead	7439-92-1	None	0.050 mg/m^3 100 mg/m^3	Groundwater Soil	inhalation, ingestion, skin, and/or eye contact	lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation to the eyes; hypertension	Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Lindane Gamma BHC HCH ã-Hexachlorocyclohexane gamma isomer of 1,2,3,4,5,6-Hexachlorocyclohexane gamma-Hexachlorocyclohexane	58-89-9	None	0.5 mg/m^3 50 mg/m^3	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, throat; headache; nausea; colonic convulsions; resp difficulty; cyanosis; aplastic anemia; muscle spasm; in animals: liver, kidney damage	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Magnesium	7439-95-4	None	15 mg/m^3 NA	Soil	inhalation, skin, and/or eye contact	irritation to the eyes, skin, respiratory system; cough	Eye: Irrigate immediately Breathing: Fresh air
1.3.1 – 1.3.18	Manganese	7439-96-5	None	5 mg/m^3 500 mg/m^3	Groundwater Soil	inhalation, ingestion	aerosol is irritating to the respiratory tract	Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	m-Cresol meta-Cresol 3-Cresol m-Cresylic acid 1-Hydroxy-3-methylbenzene 3-Hydroxytoluene 3-Methylphenol 3-Methylphenols	108-39-4	PID	5 ppm 250 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, mucous membrane; central nervous system effects: confusion, depression, resp failure; dyspnea (breathing difficulty), irregular rapid respiration, weak pulse; eye, skin, burns; dermatitis; lung, liver, kidney, pancreas damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Mercury	7439-97-6	None	0.1 mg/m^3 10 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Methoxychlor 4,4'-Methoxychlor p,p'-Dimethoxydiphenyltrichloroethane DMDT Methoxy-DDT 2,2-bis(p-Methoxyphenyl)-1,1,1-trichloroethane 1,1,1-Trichloro-2,2-bis-(p-methoxyphenyl)ethane	72-43-5	None	15 mg/m^3 5000 mg/m^3	Groundwater Soil Vapor	inhalation, ingestion	fasciculation, trembling, convulsions; kidney, liver damage; [potential occupational carcinogen]	Skin: Soap wash Breathing: Fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.18	Methyl Bromide Bromomethane Monobromomethane	74-83-9	PID	20 ppm 250 ppm	Soil Groundwater Vapor	inhalation, skin absorption (liquid), skin, and/or eye contact (liquid)	irritation to the eyes, skin, respiratory system; muscle weak, incoordination, visual disturbance, dizziness; nausea, vomiting, headache; malaise (vague feeling of discomfort); hand tremor; convulsions; dyspnea (breathing difficulty); skin, vesiculation; liquid: frostbite; [potential occupational carcinogen]	Eye: Irrigate immediately (liquid) Skin: Water flush immediately (liquid) Breathing: Respiratory support

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Methyl Chloride Chloromethane Monochloromethane Refrigerant-40 R-40	74-87-3	NA	100 ppm 2000 ppm	Groundwater Soil	inhalation, skin, and/or eye contact	dizziness, nausea, vomiting; visual disturbance, stagger, slurred speech, convulsions, coma; liver, kidney damage; liquid: frostbite; reproductive, teratogenic effects; [potential occupational carcinogen]	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support
1.3.1 – 1.3.18	Methyl chloroform Chlorothene 1,1,1-Trichloroethane 1,1,1-Trichloroethane-(stabilized) 1,1,1-TCA 1,1,1-Trichbroethane TCA	71-55-6	PID	350 ppm 700 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin; headache, lassitude (weakness, exhaustion), central nervous system depression, poor equilibrium; dermatitis; cardiac arrhythmias; liver damage	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention
1.3.1 – 1.3.18	Methyl *tert*-butyl ether MTBE Methyl tertiary-butyl ether Methyl t-butyl ether tert-Butyl methyl ether tBME tert-BuOMe Methyl tert butyl ether	1634-04-4	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Methylcyclohexane Methyl cyclohexane Methylcyclohexane Hexahydrotoluene Cyclohexylmethane Toluene hexahydride	108-87-2	PID	500 ppm 1200 ppm	Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, drowsiness; in animals: narcosis	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Methylene Chloride Dichloromethane Methylene dichloride	75-09-2	PID	25 ppm 2300 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin; lassitude (weakness, exhaustion), drowsiness, dizziness; numb, tingle limbs; nausea; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	m-Xylenes 1,3-Dimethylbenzene m-Xylol Metaxylene	108-38-3 179601-23-1	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Naphthalene Naphthalin Tar camphor White tar	91-20-3	PID	50 mg/m^3 250 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; hematuria (blood in the urine); dermatitis, optical neuritis	Eye: Irrigate immediately Skin: Molten flush immediately/solid-liquid soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	n-Butylbenzene Butylbenzene 1-phenylbutane	104-51-8	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin; dry nose, throat; headache; low blood pressure, tachycardia, abnormal cardiovascular system stress; central nervous system, hematopoietic depression; metallic taste; liver, kidney injury	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	N-ethyl perfluorooctane sulfonamido acetic acid NEtFOSAA N-ethyl perfluorooctane sulfonamido acetic acid (N-EtFOSAA) N-Ethylperfluorooctanesulfonamide N-Ethyl Perfluorooctanesulfonamidoacetic Acid N-ethyl perfluorooctane-sulfonamidoacetic acid N-Ethyl-N-[(heptadecafluorooctyl)sulphonyl]glycine	2991-50-6	NA	None None	Groundwater Soil	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	n-Hexane Hexane, Hexyl hydride, normal-Hexane	110-54-3	PID	500 ppm 1100 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, nose; nausea, headache; peripheral neuropathy: numb extremities, muscle weak; dermatitis; dizziness; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Nickel	7440-02-0	None	NA 10 mg/m^3	Groundwater Soil	ion, ingestion, skin, and/or eye contact	sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]	Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Non-Flammable Gas Mixture CALGAS (Equipment Calibration Gas : Oxygen Methane Hydrogen Sulfide Carbon Monoxide Nitrogen	 7782-44-7 74-82-8 7783-08-4 830-08-0 7727-37-9	Multi-Gas PID	 NA/NA NA/NA 10/100 ppm 50/1200 ppm NA/NA	NA	inhalation	dizziness, headache, and nausea	Breathing: Respiratory support
1.3.1 – 1.3.18	Non-Flammable Gas Mixture CALGAS (Equipment Calibration Gas : Oxygen Isobutylene Nitrogen	 7782-44-7 115-11-7 7727-37-9	PID	 NA/NA NA/NA NA/NA	NA	inhalation	dizziness, headache, and nausea	Breathing: Respiratory support

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	n-Propylbenzene Isocumene Propylbenzene 1-Phenylpropane 1-Propylbenzene Phenylpropane Propylbenzene-n	103-65-1	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin; dry nose, throat; headache; low blood pressure, tachycardia, abnormal cardiovascular system stress; central nervous system, hematopoietic depression; metallic taste; liver, kidney injury	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	o-Chlorotoluene 1-Chloro-2-methylbenzene 2-Chloro-1-methylbenzene 2-Chlorotoluene o-Tolyl chloride 2-Cyclohexane	95-49-8	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation eyes, skin, mucous membrane; dermatitis; drowsiness, incoordination, anesthesia; cough; liver, kidney injury	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	o-Cresol ortho-Cresol 2-Cresol o-Cresylic acid 1-Hydroxy-2-methylbenzene 2-Hydroxytoluene 2-Methyl phenol 2-Methylphenol	95-48-7	PID	5 ppm 250 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, mucous membrane; central nervous system effects: confusion, depression, resp failure; dyspnea (breathing difficulty), irregular rapid respiration, weak pulse; eye, skin, burns; dermatitis; lung, liver, kidney, pancreas damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	o-Xylenes 1,2-Dimethylbenzene ortho-Xylene o-Xylol	95-47-6 179601-23-1	PID	100 ppm 900 ppm	Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	p-Cresol para-Cresol 4-Cresol p-Cresylic acid 1-Hydroxy-4-methylbenzene 4-Hydroxytoluene 4-Methylphenol 4-Methylphenols	106-44-5	PID	5 ppm 250 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, mucous membrane; central nervous system effects: confusion, depression, resp failure; dyspnea (breathing difficulty), irregular rapid respiration, weak pulse; eye, skin, burns; dermatitis; lung, liver, kidney, pancreas damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediatelym
1.3.1 – 1.3.18	p-Diethylbenzene 1,4-Diethylbenzene 1,4-Diethyl benzene	105-05-5	PID	None None	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, respiratory system; skin, burns; in animals: central nervous system depression	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Pentachlorophenol PCP; Penta; 2,3,4,5,6-Pentachlorophenol	87-86-5	PID	0.5 mg/m^3 2.5 mg/m^3	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, nose, throat; sneezing, cough; lassitude (weakness, exhaustion), anorexia, weight loss; sweating; headache, dizziness; nausea, vomiting; dyspnea (breathing difficulty), chest pain; high fever; dermatitis	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Perfluorobutanesulfonic acid FC-98 Nonaflate Nonafluorobutanesulphonic acid Perfluorobutanesulfonic Acid Perfluorobutane sulfonate PFBS	375-73-5	NA	None None	Groundwater	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Perfluorobutanoic Acid Heptafluorobutyric acid Heptafluorobutanoic acid Perfluorobutyric acid PFBA	375-22-4	NA	None None	Groundwater	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Perfluorodecanesulfonic Acid PFDS	335-77-3	NA	NA NA	Groundwater	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Perfluorodecanoic acid PFDA	335-76-2	NA	None None	Groundwater	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Perfluorododecanoic acid Perfluoralauric acid Tricosafluorododecanoic acid PFDoA	307-55-1	NA	None None	Groundwater Soil	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Perfluoroheptane sulfonic Acid Perfluoroheptane sulfonate Perfluoroheptanesulfonic acid PFHpS	375-92-8	NA	None None	Groundwater Soil	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Perfluoroheptanoic acid Perfluoroheptanoic acid Tridecafluoroheptanoic acid PFHpA	375-85-9	NA	None None	Groundwater	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Perfluorohexanesulfonic Acid perfluorohexanesulfonate perfluorohexanesulfonic acid Perfluorohexane-1-sulphonic acid PFHxS	355-46-4	NA	None None	Groundwater Soil	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Perfluorohexanoic Acid PFHxA	307-24-4	NA	None None	Groundwater	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Perfluoronoanoic Acid Perfluorononanoic Acid PFNA perfluoro-n-nonanoic acid perfluorononanoate	375-95-1	NA	None None	Groundwater	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Perfluorooctanesulfonamide Erfluoroctylsulfonamide Perfluorooctane sulfonamide Heptadecafluorooctanesulphonamide Perfluorooctanesulfonic acid amide Deethylsulfluramid FC-99 PFOSA FOSA	754-91-6	NA	NA NA	Groundwater	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Perfluorooctanesulfonic Acid PFOS	1763-23-1	NA	None None	Groundwater	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Perfluorooctanoic Acid PFOA pentadecafluorooctanoic acid perfluorooctanoate perfluorocaprylic acid	335-67-1	NA	None None	Groundwater	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Perfluoropentanesulfonic Acid Perfluoropentanesulfonic acid 1,1,2,2,3,3,4,4,5,5,5-Undecafluoropentane-1-sulfonic acid 1,1,2,2,3,3,4,4,5,5,5-Undecafluoropentane-1-sulphonic acid Perfluoropentane-1-sulfonic acid perfluoropentane-1-sulphonic acid Perfluoropentanesulphonic acid UNDECAFLUOROPENTANE-1-SULFONIC ACID PFPeS	2706-91-4	NA	None None	Groundwater Soil	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Perfluoropentanoic Acid PFPeA	2706-90-3	NA	None None	Groundwater	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Perfluorotridecanoic Acid PFTrDA	72629-94-8	NA	None None	Groundwater	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Perfluoroundecanoic Acid PFUnA PFUnDA Perfluoroundecanoic Acid Henicosafluoroundecanoic Acid	2058-94-8	NA	None None	Groundwater	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	p-Ethyltoluene 4-Ethyltoluene 1-ethyl-4-methyl-benzene 1-methyl-4-ethylbenzene	622-96-8	NA	NA NA	Soil	ingestion, skin, and/or eye contact	irritation to the eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Phenanthrene	85-01-8	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, skin, or eye contact, ingestion	irritation to eyes and skin, respiratory irritation (dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.18	Phenol Carbolic acid Hydroxybenzene, Monohydroxybenzene Phenyl alcohol Phenyl hydroxide	108-95-2	PID	5 ppm 250 ppm	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, nose, throat; anorexia, weight loss; lassitude (weakness, exhaustion), muscle ache, pain; dark urine, skin, burns; dermatitis; tremor, convulsions, twitching	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Potassium	7440-09-7	None	NA NA	Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact inhalation, ingestion, skin, and/or eye contact	eye: Causes eye burns. Skin: Causes skin, burns. Reacts with moisture in the skin, to form potassium hydroxide and hydrogen with heat. ingestion: Causes gastrointestinal tract burns. inhalation: May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Causes chemical burns to the respiratory tract. inhalation may be fatal because of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema.	Eyes: Get medical aid immediately Skin: Get medical aid immediately. Immediately flush skin with water for at least 15 minutes while removing contaminated clothing and shoes. Ingestion: If victim is conscious and alert, give 2-4 full cups of milk or water. Get medical aid immediately. inhalation: Get medical aid immediately.
1.3.1 – 1.3.18	Propylene dichloride Dichloro-1,2-propane 1,2-Dichloropropane	78-87-5	PIDL	75 ppm 400 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, respiratory system; drowsiness, dizziness; liver, kidney damage; in animals: central nervous system depression; [potential occupational carcinogen]	irritation to the eyes, skin, respiratory system; drowsiness, dizziness; liver, kidney damage; in animals: central nervous system depression; [potential occupational carcinogen]

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	p-Xylenes 1,4-Dimethylbenzene para-Xylene p-Xylol	106-42-3	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Pyrene benzo[def]phenanthrene	129-00-0	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, skin, or eye contact, ingestion	irritation to eyes and skin, respiratory irritation (dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.18	sec-Butylbenzene 2-phenylbutane	135-98-8	PID	10 ppm 100 ppm	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, nose, throat. inhalation: nausea or vomiting	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Selenium	7782-49-2	None	1 mg/m^3 0.2 mg/m^3	Soil	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin, burns; in animals: anemia; liver necrosis, cirrhosis; kidney, spleen damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Silver	7440-22-4	None	0.01 mg/m^3 10 mg/m^3	Soil	inhalation, ingestion, skin, and/or eye contact	blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance	Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Silvex 2-(2,4,5-Trichlorophenoxy)propionic acid Fenoprop 2,4,5-TP Acid 2,4,5-TP	93-72-1	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, nose, respiratory system; headache, lassitude (weakness, exhaustion), dizziness, confusion, malaise (vague feeling of discomfort), drowsiness, unsteady gait; narcosis; defatting dermatitis; liver injury; reproductive effects	Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Sodium	7440-23-5	None	NA NA	Groundwater Soil	ion, ingestion, skin, and/or eye contact	sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]	Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate; 8:2 FTS Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate (8:2) (8:2FTS)	27619-96-1	NA	None None	Groundwater	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Sodium 1H,1H,2H,2H-perfluorooctanesulfonate 2-(Perfluorohexyl)ethane-1-sulfonic Acid Sodium Salt ,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluoro-1-octanesulfonic Acid Sodium Salt; Sodium 1H,1H,2H,2H-perfluoro-1-[1,2-13C2]-octane sulfonate (6:2) Sodium Salt; 3,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluorooctane-1-sulfonic Acid Sodium Salt; 3,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluorooctanesulfonic Acid Sodium Salt; 6:2 FTS Impurity: Sodium 1H, 1H, 2H, 2H-Perfluorooctane Sulfonic (6:2) Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2) Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2) (6:2FTS)	27619-94-9	NA	None None	Groundwater	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Styrene Ethenyl benzene Phenylethylene Styrene monomer Styrol Vinyl benzene	100-42-5	PID	100 ppm 700 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, nose, respiratory system; headache, lassitude (weakness, exhaustion), dizziness, confusion, malaise (vague feeling of discomfort), drowsiness, unsteady gait; narcosis; defatting dermatitis; liver injury; reproductive effects	Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Tert-Butyl Alcohol Tertiary Butyl Alcohol Tert-Butanol Butyl alcohol 2-Methyl-2-propanol Trimethyl carbinol Tert-Butyl Alcohol TBA	75-65-0	PID	100 ppm 1600 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, throat; drowsiness, narcosis	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	tert-Butylbenzene *t*-Butylbenzene 2-Methyl-2-phenylpropane Pseudobutylbenzene	98-06-6	PID	10 ppm NA	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	eye, skin, irritation; dry nose, throat; headaches; low blood pressure, tachycardia; abnormal cardiovascular system; central nervous system depression; hematopoietic depression	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Tetrachloroethylene Perchlorethylene Perchloroethylene PCE Perk Tetrachlorethylene Tetrachloroethene	127-18-4	PID	100 ppm 150 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin, erythema (skin, redness); liver damage; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Tetrafluoro-2-(heptafluoropropoxy) propanoic Acid 2,3,3,3-Tetrafluoro-2-(heptafluoropropoxy)propanoic acid Perfluoro-2-propoxypropanoic acid hexafluoropropylene oxide dimer acid HFPO-DA (Gen-X) FRD-903 HFPO-DA perfluoroalkyl ether carboxylic acid (PFECA) Undecafluoro-2-methyl-3-oxahexanoic acid Tetrafluoro-2-(heptafluoropropoxy) propanoic Acid	13252-13-6	NA	None None	Groundwater Soil	inhalation, skin, or eye contact, ingestion	irritation to eyes with eye damage, skin, causing rash, redness or burning, irritation to nose, throat, and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Tetrahydrofuran Diethylene oxide 1,4-Epoxybutane Tetramethylene oxide THF	109-99-9	PID	200 ppm 2000 ppm	Groundwater Soil Vapor	inhalation, skin, and/or eye contact, ingestion	irritation to the eyes, upper respiratory system; nausea, dizziness, headache, central nervous system depression	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Thallium	7440-28-0	None	0.1 mg/m^3 15 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	nausea, diarrhea, abdominal pain, vomiting; ptosis, strabismus; peri neuritis, tremor; retrosternal (occurring behind the sternum) tightness, chest pain, pulmonary edema; convulsions, chorea, psychosis; liver, kidney damage; alopecia; paresthesia legs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Toluene Methyl benzene Methyl benzol Phenyl methane Toluol	108-88-3	PID	200 ppm 500 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, paresthesia; dermatitis	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Total PCBs Chlorodiphenyl (42% chlorine) Aroclor® 1242 PCB Polychlorinated biphenyl	53469-21-9	None	0.5 mg/m^3 5 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, chloracne	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Total Petroleum Hydrocarbons TPH	143-07-7	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, mucous membrane; dermatitis; headache, lassitude (weakness, exhaustion), blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Total Xylenes Dimethylbenzene Xylol	1330-20-7	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Trans-1,2-Dichloroethene trans-1,2-Dichloroethylene tDEC trans-Acetylene dichloride	156-60-5	PID	200 ppm 4000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	Irritant to eyes, skin, mucous membranes, and respiratory system. May be harmful by ingestion, skin absorption and inhalation	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Trans-Chlordane	5103-74-2	None	0.5 mg/m^3 100 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	Blurred vision; confusion; ataxia, delirium; cough; abdominal pain, nausea, vomiting, diarrhea; irritability, tremor, convulsions; anuria	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Trichloroethylene Trichloroetheneylenes Ethylene trichloride TCE Trichloroethene Trilene	79-01-6	PID	100 ppm 1000 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Trichlorofluoromethane Fluorotrichloromethane Freon® 11 Monofluorotrichloromethane Refrigerant 11 Trichloromonofluoromethane Freon 11	75-69-4	PID	1000 ppm 2000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin, and/or eye contact	incoordination, tremor; dermatitis; cardiac arrhythmias, cardiac arrest; asphyxia; liquid: frostbite	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Trivalent Chromium Chromium III Chromium, Trivalent	NA	None	1.0 mg/m^3 250 mg/m^3	Groundwater Soil	inhalation absorption ingestion	irritation to eye, skin, and respiratory	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Vanadium	7440-62-2	None	0.1 mg/m3 15 mg/m3	Groundwater Soil	inhalation, skin absorption, ingestion, skin, and/or eye contact	nausea, diarrhea, abdominal pain, vomiting; ptosis, strabismus; peri neuritis, tremor; retrosternal (occurring behind the sternum) tightness, chest pain, pulmonary edema; convulsions, chorea, psychosis; liver, kidney damage; alopecia; paresthesia legs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Vinyl Chloride Chloroethene Chloroethylen Ethylene monochloride Monochloroethene Monochloroethylene VC Vinyl chloride monomer (VCM)	75-01-4	PID	1 ppm NA	Groundwater Soil Vapor	inhalation, skin, and/or eye contact (liquid)	lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen]	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support
1.3.1 – 1.3.18	Vinylidene chloride 1,1-DCE 1,1-Dichloroethene 1,1-Dichloroethylene VDC Vinylidene chloride monomer Vinylidene dichloride	75-35-4	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.18	Volatile Organic Compounds VOCs	NA	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin, and/or eye contact	irritation to the eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.18	Zinc	7440-62-2	None	15 mg/m^3 500 mg/m^3	Groundwater Soil	inhalation	chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

EXPLANATION OF ABBREVIATIONS

PID = Photoionization Detector
PEL = Permissible Exposure Limit (8-hour Time Weighted Average)
IDLH = Immediately Dangerous to Life and Health
ppm = part per million
mg/m^3 = milligrams per cubic meter
500 mg/m^3

TABLE 3
SUMMARY OF MONITORING EQUIPMENT

Instrument	Operation Parameters
Photoionization Detector (PID)	**Hazard Monitored:** Many organic and some inorganic gases and vapors. **Application:** Detects total concentration of many organic and some inorganic gases and vapors. Some identification of compounds is possible if more than one probe is measured. **Detection Method:** Ionizes molecules using UV radiation; produces a current that is proportional to the number of ions. **General Care/Maintenance:** Recharge or replace battery. Regularly clean lamp window. Regularly clean and maintain the instrument and accessories. **Typical Operating Time:** 10 hours. 5 hours with strip chart recorder.
Oxygen Meter	**Hazard Monitored:** Oxygen (O_2). **Application:** Measures the percentage of O_2 in the air. **Detection Method:** Uses an electrochemical sensor to measure the partial pressure of O_2 in the air and converts the reading to O_2 concentration. **General Care/Maintenance:** Replace detector cell according to manufacturer's recommendations. Recharge or replace batteries prior to explanation of the specified interval. If the ambient air is less than 0.5% C O_2, replace the detector cell frequently. **Typical Operating Time:** 8 – 12 hours.
Additional equipment (if needed, based on site conditions)	
Combustible Gas Indicator (CGI)	**Hazard Monitored:** Combustible gases and vapors. **Application:** Measures the concentration of combustible gas or vapor. **Detection Method:** A filament, usually made of platinum, is heated by burning the combustible gas or vapor. The increase in heat is measured. Gases and vapors are ionized in a flame. A current is produced in proportion to the number of carbon atoms present. **General Care/Maintenance:** Recharge or replace battery. Calibrate immediately before use. **Typical Operating Time:** Can be used for as long as the battery lasts, or for the recommended interval between calibrations, whichever is less.
Flame Ionization Detector (FID) with Gas Chromatography Option *(i.e., Foxboro Organic Vapor Analyzer (OVA))*	**Hazard Monitored:** Many organic gases and vapors (approved areas only). **Application:** In survey mode, detects the concentration of many organic gases and vapors. In gas chromatography (GC) mode, identifies and measures specific compounds. In survey mode, all the organic compounds are ionized and detected at the same time. In GC mode, volatile species are separated. **General Care/Maintenance:** Recharge or replace battery. Monitor fuel and/or combustion air supply gauges. Perform routine maintenance as described in the manual. Check for leaks. **Typical Operating Time:** 8 hours; 3 hours with strip chart recorder.
Potable Infrared (IR) Spectrophotometer	**Hazard Monitored:** Many gases and vapors. **Application:** Measures concentration of many gases and vapors in air. Designed to quantify one or two component mixtures. **Detection Method:** Passes different frequencies of IR through the sample. The frequencies absorbed are specific for each compound. **General Care/Maintenance:** As specified by the manufacturer.

Instrument	Operation Parameters
Direct Reading Colorimetric Indicator Tube	**Hazard Monitored:** Specific gas and vapors. **Application:** Measures concentration of specific gases and vapors. **Detection Method:** The compound reacts with the indicator chemical in the tube, producing a stain whose length or color change is proportional to the compound's concentration. **General Care/Maintenance:** Do not use a previously opened tube even if the indicator chemical is not stained. Check pump for leaks before and after use. Refrigerate before use to maintain a shelf life of about 2 years. Check expiration dates of tubes. Calibrate pump volume at least quarterly. Avoid rough handling which may cause channeling.
Aerosol Monitor	**Hazard Monitored:** Airborne particulate (dust, mist, fume) concentrations. **Application:** Measures total concentration of semi-volatile organic compounds, PCBs, and metals. **Detection Method:** Based on light-scattering properties of particulate matter. Using an internal pump, air sample is drawn into the sensing volume where near infrared light scattering is used to detect particles. **General Care/Maintenance:** As specified by the mfr. Also, the instrument must be calibrated with particulates of a size and refractive index similar to those to be measured in the ambient air.
Monitox	**Hazard Monitored:** Gases and vapors. **Application:** Measures specific gases and vapors. **Detection Method:** Electrochemical sensor specific for the chemical species in question. **General Care/Maintenance:** Moisten sponge before use; check the function switch; change the battery when needed.
Gamma Radiation Survey Instrument	**Hazard Monitored:** Gamma Radiation. **Application:** Environmental radiation monitor. **Detection Method:** Scintillation detector. **General Care/Maintenance:** Must be calibrated annually at a specialized facility. **Typical Operating Time:** Can be used for as long as the battery lasts, or for the recommended interval between calibrations, whichever is less.

TABLE 4
INSTRUMENTATION ACTION LEVELS

Photoionization Detector Action Levels	**Action Required**
Background to 5 parts per million (ppm)[1]	No respirator needed; no further action
>5ppm but </= 15 ppm at the perimeter of the work area	• Work temporarily halted and monitoring continues. • If instantaneous readings decrease below 5 ppm above background, work activities will resume with continued monitoring
>5ppm but </= 25 ppm at the downwind perimeter of the hot zone	• Work activities will be halted. • Source of vapors identified. • Corrective actions taken to abate emissions. • Continued monitoring. • Workers will don appropriate respirators and work can resume if vapor levels 200 feet downwind or the hot zone or half the distance to the nearest potential receptor or residential or commercial structure, whichever is less – but in no case less than 20 feet – is below 5 ppm above background for the 15-minute average
>25ppm at the parameter of the hot zone	Activities will shut down

Particulate Monitoring Action Levels	**Action Required**
Background to 100 micrograms per cubic meter (µg/m³)[2], no dust observed	No further action
Background to 100 µg/m³, dust observed leaving the work area	Dust suppression must be employed.
100 to 150 µg/m³ at the downwind parameter of the hot zone	• Work activities will be halted. • Source of dust identified. • Dust suppression activities initiated. • Corrective actions taken to abate emissions. • Continued monitoring. • Workers will don appropriate respirators. • Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM10 concentration to within 150 µg/m³ of the upwind level and in preventing visible dust migration.
>150 µg/m³ at the parameter of the hot zone	Activities will shut down

[1] VOC concentrations are 15-minute averages above site background (upwind parameter)
[2] Particulate concentrations are 15-minute averages above site background (upwind parameter)

TABLE 5
EMERGENCY NOTIFICATION LIST

ORGANIZATION	CONTACT	TELEPHONE
Local Police Department		911
Local Fire Department		911
Ambulance/Rescue Squad		911
Hospital		
Langan Incident Hotline		973-560-4699
Medical Treatment Hotline	WorkCare™	911 or 888-449-7757
Langan Environmental Project Manager	Meghan Aronica	716-525-7260 (cell)
Langan Construction Health and Safety Manager (HSM)	Tony Moffa	215-756-2523 (cell)
Langan Health & Safety Officer (HSO)	William Bohrer	410-984-3068 (cell)
Langan Field Team Leader (FTL)	To Be Determined	
Client's Representative	Donald Capoccia	718-422-9999
National Response Center (NRC)		800-424-8802
Chemical Transportation Emergency Center (Chemtrec)		800-424-9300
Center for Disease Control (CDC)		404-639-3534
EPA (RCRA Superfund Hotline)		800-424-9346
TSCA Hotline		202-554-1404
Poison Control Center		800-222-1222

Immediately following an injury, unless immediate emergency medical treatment is required, the injured employee must contact WorkCare - Incident Intervention® at 888-449-7787.

For all other incidents or near misses, unless emergency response is required, either the employee or a coworker must contact the Langan Incident Hotline at 973-560-4699.

TABLE 6
SUGGESTED FREQUENCY OF PHYSIOLOGICAL MONITORINGFOR FIT AND ACCLIMATED WORKERS[A]

Adjusted Temperature[b]	Normal Work Ensemble[c]	Impermeable Ensemble
90°F or above (32.2°C) or above	After each 45 min. of work	After each 15 min. of work
87.5°F (30.8°-32.2°C)	After each 60 min. of work	After each 30 min. of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 min. of work	After each 60 min. of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 min. of work	After each 90 min. of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 min. of work	After each 120 min. of work

a For work levels of 250 kilocalories/hour.

b Calculate the adjusted air temperature (ta adj) by using this equation: ta adj ^{o}F = ta ^{o}F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

c A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

TABLE 7
HEAT INDEX

FIGURES

FIGURE 1
SITE LOCATION MAP



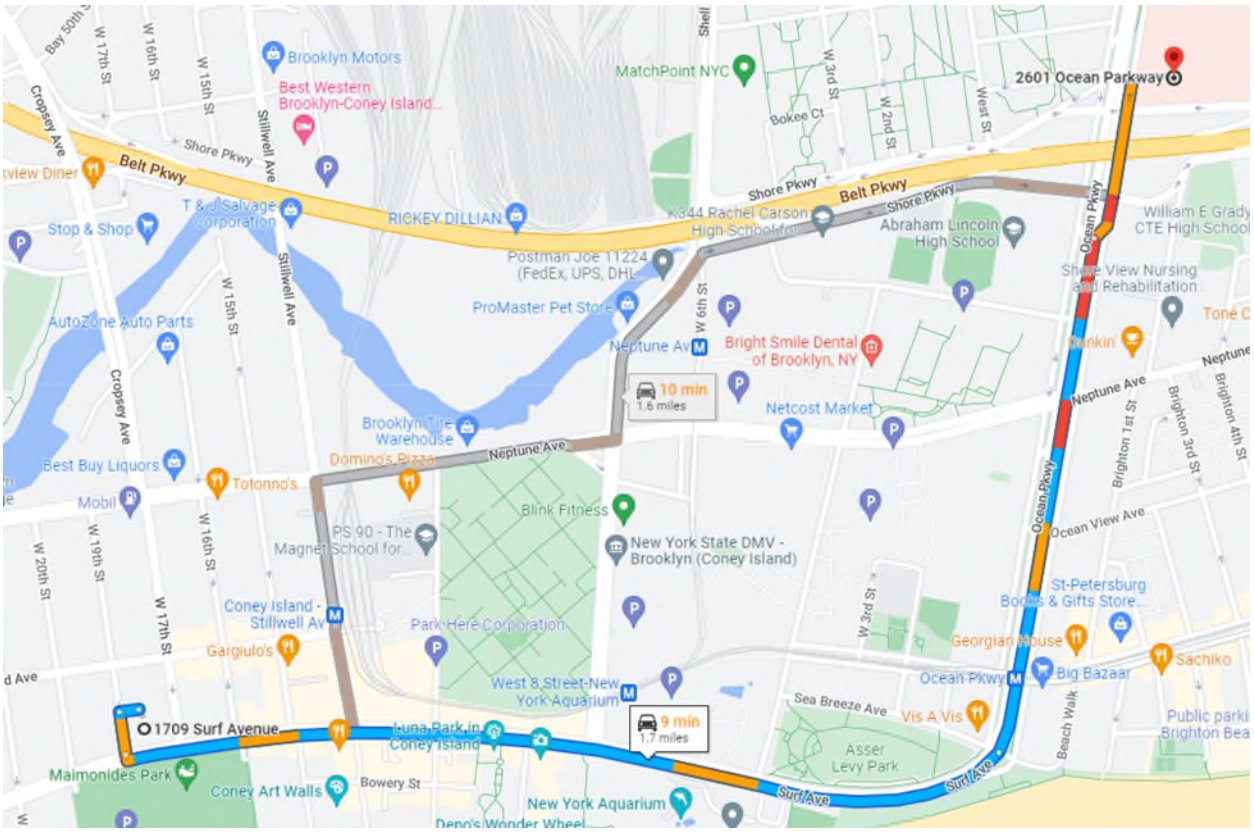
FIGURE 2
HOSPITAL ROUTE PLAN

Hospital Location: **Coney Island Hospital**
2601 Ocean Parkway
Brooklyn, New York
718-616-3000

START: 1709 Surf Avenue, Brooklyn, New York

1. Head south toward West 19th Street
2. Turn left onto West 19th Street
3. Use the left 2 lanes to turn left at the 1st cross street onto Surf Avenue
4. Continue onto Ocean Parkway
5. Slight right onto Ocean Parkway Service Road.

END: Coney Island Hospital, 2601 Ocean Parkway, Brooklyn, New York



ATTACHMENTS

ATTACHMENT A

STANDING ORDERS

STANDING ORDERS

GENERAL

- No smoking, eating, or drinking in this work zone.
- Upon leaving the work zone, personnel will thoroughly wash their hands and face.
- Minimize contact with contaminated materials through proper planning of work areas and decontamination areas, and by following proper procedures. Do not place equipment on the ground. Do not sit on contaminated materials.
- No open flames in the work zone.
- Only properly trained and equipped personnel are permitted to work in potentially contaminated areas.
- Always use the appropriate level of personal protective equipment (PPE).
- Maintain close contact with your buddy in the work zone.
- Contaminated material will be contained in the Exclusion Zone (EZ).
- Report any unusual conditions.
- Work areas will be kept clear and uncluttered. Debris and other slip, trip, and fall hazards will be removed as frequently as possible.
- The number of personnel and equipment in the work zone will be kept to an essential minimum.
- Be alert to the symptoms of fatigue and heat/cold stress, and their effects on the normal caution and judgment of personnel.
- Conflicting situations which may arise concerning safety requirements and working conditions must be addressed and resolved quickly by the site HSO.

TOOLS AND HEAVY EQUIPMENT

- Do not, under any circumstances, enter or ride in or on any backhoe bucket, materials hoist, or any other device not specifically designed to carry passengers.
- Loose-fitting clothing or loose long hair is prohibited around moving machinery.
- Ensure that heavy equipment operators and all other personnel in the work zone are using the same hand signals to communicate.
- Drilling/excavating within 10 feet in any direction of overhead power lines is prohibited.
- The locations of all underground utilities must be identified and marked out prior to initiating any subsurface activities.
- Check to ensure that the equipment operator has lowered all blades and buckets to the ground before shutting off the vehicle.
- If the equipment has an emergency stop device, have the operator show all personnel its location and how to activate it.
- Help the operator ensure adequate clearances when the equipment must negotiate in tight quarters; serve as a signal operator to direct backing, as necessary.
- Ensure that all heavy equipment that is used in the Exclusion Zone is kept in that zone until the job is done and that such equipment is completely decontaminated before moving it into the clean area of the work zone.
- Samplers must not reach into or get near rotating equipment such as the drill rig. If personnel must work near any tools that could rotate, the equipment operator must completely shut down the rig prior to initiating such work. It may be necessary to use a remote sampling device.

ATTACHMENT B

DECONTAMINATION PROCEDURES

PERSONNEL DECONTAMINATION

LEVEL C DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross-contamination. During hot weather operations, cool down stations may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves, and chemical-resistant splash suit with decon solution or detergent and water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Canister or Mask Change	4. If worker leaves Exclusion Zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.
Station 5:	Boot, Gloves and Outer Garment Removal	5. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 6:	Face piece Removal	6. Face piece is removed (avoid touching face with fingers). Face piece deposited on plastic sheets.
Station 7:	Field Wash	7. Hands and face are thoroughly washed. Shower as soon as possible.

LEVEL D DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down stations may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and chemical-resistant splash suit with decon solution or detergent and water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Boot, Gloves and Outer Garment Removal	4. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 5:	Field Wash	5. Hands and face are thoroughly washed. Shower as soon as possible.

EQUIPMENT DECONTAMINATION

GENERAL:

Equipment to be decontaminated during the project may include tools, monitoring equipment, respirators, sampling containers, laboratory equipment, and drilling equipment.

All decontamination will be done by personnel in protective gear, appropriate for the level of decontamination, as determined by the site HSO. The decontamination work tasks will be split or rotated among support and work crews.

Depending on site conditions, backhoes and pumps may be decontaminated over a portable decontamination pad to contain wash water; or wash water may be allowed to run off into a storm sewer system. Equipment needed may include a steam generator with high-pressure water, empty drums, screens, screen support structures, and shovels. Drums will be used to hold contaminated wash water pumped from the lined pit. These drums will be labeled as such.

Miscellaneous tools and equipment will be dropped into a plastic bucket, tub, or other containers. They will be brushed off and rinsed with a detergent solution, and finally rinsed with clean water.

MONITORING EQUIPMENT:

Monitoring equipment will be protected as much as possible from contamination by draping, masking, or otherwise covering as many of the instruments as possible with plastic without hindering the operation of the unit. The PID, HNu, or OVA meter, for example, can be placed in a clear plastic bag, which allows reading of the scale and operation of knobs. The probes can be partially wrapped keeping the sensor tip and discharge port clear.

The contaminated equipment will be taken from the drop area and the protective coverings removed and disposed of in the appropriate containers. Any dirt or obvious contamination will be brushed or wiped with a disposable paper wipe.

RESPIRATORS:

Respirators will be cleaned and disinfected after every use. Taken from the drop area, the masks (with the cartridges removed and disposed of with other used disposable gear) will be immersed in a cleaning solution and scrubbed gently with a soft brush, followed by a rinse in plain warm water, and then allowed to air dry. In the morning, new cartridges will be installed. Personnel will inspect their own masks for serviceability prior to donning them. And, once the mask is on, the wearer will check the respirator for leakage using the negative and positive pressure fit check techniques.

ATTACHMENT C

EMPLOYEE EXPOSURE/INJURY INCIDENT REPORT

EMPLOYEE INCIDENT/INJURY REPORT
LANGAN ENGINEERING & ENVIRONMENTAL SERVICES

(Complete and return to Tony Moffa in the Doylestown Office)

Affected Employee Name: _____ Date: _____

Incident type: ☐ Injury ☐ Report Only/No Injury
☐ Near Miss ☐ Other: _____

EMPLOYEE INFORMATION (Person completing Form)

Employee Name: _____ Employee No: _____

Title: _____ Office Location: _____

Length of time employed or date of hire: _____

Mailing address: _____

_____

Sex: M ☐ F ☐ Birth date: _____

Business phone & extension: _____ Residence/cell phone: _____

ACCIDENT INFORMATION

Project: _____ Project #: _____

Date & time of incident: _____ Time work started & ended: _____

Site location: _____

Incident Type: Possible Exposure ☐ Exposure ☐ Physical Injury ☐

Names of person(s) who witnessed the incident:_____

_____

_____

Exact location incident occurred:

_____

_____

Describe work being done:_____

_____

_____

_____

Describe what affected employee was doing prior to the incident occurring:

_____

_____

_____

Describe in detail how the incident occurred:

_____

_____

_____

_____

Nature of the incident (List the parts of the body affected):

_____

_____

_____

_____

Person(s) to whom the incident was reported (Time and Date):

_____

_____

List the names of other persons affected during this incident:

_____

_____

Possible causes of the incident (equipment, unsafe work practices, lack of PPE, etc.):

Weather conditions during incident:

MEDICAL CARE INFORMATION

Did affected employee receive medical care? Yes ☐ No ☐

If Yes, when, and where was medical care received:

Provide name of facility (hospital, clinic, etc.):

Length of stay at the facility.

Did the employee miss any work time? Yes ☐ No ☐ Undetermined ☐

Date employee last worked: _____ Date employee returned to work:

Has the employee returned to work? Yes ☐ No ☐

Does the employee have any work limitations or restrictions from the injury? : Yes ☐ No ☐

If Yes, please describe:

Did the exposure/injury result in permanent disability? Yes ☐ No ☐ Unknown ☐

If Yes, please describe:

HEALTH & SAFETY INFORMATION

Was the operation being conducted under an established site-specific Construction Health and Safety Plan?
Yes ☐ No ☐ Not Applicable: ☐

Describe protective equipment and clothing used by the employee:

_____

_____

_____

Did any limitations in safety equipment or protective clothing contribute to or affect exposure/injury? If so, explain:

_____

_____

_____

_____

Employee Signature Date

_____

Langan Representative Date

ATTACHMENT D

CALIBRATION LOG

DATE:_____ **PROJECT:**_____

CALIBRATION LOG

Date & Time	Inst Type	Inst #	Media	Initial Reading	Span #	Calibrate Reading	Performed By:

ATTACHMENT E

SAFETY DATA SHEETS

SAFETY DATA SHEET

Version 4.10
Revision Date 01/28/2016
Print Date 02/18/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Biphenyl

Product Number : W312908
Brand : Aldrich
Index-No. : 601-042-00-8

CAS-No. : 92-52-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.

P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_{12}H_{10}$
Molecular weight	:	154.21 g/mol
CAS-No.	:	92-52-4
EC-No.	:	202-163-5
Index-No.	:	601-042-00-8

Hazardous components

Component	Classification	Concentration
Biphenyl		
	Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; Aquatic Acute 1; Aquatic Chronic 1; H315, H319, H335, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Biphenyl	92-52-4	TWA	0.2 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Pulmonary function		
		TWA	0.200000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Pulmonary function		

		TWA	0.2 ppm 1 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	0.200000 ppm 1.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	0.2 ppm 1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	0.200000 ppm 1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 30 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator.For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: crystalline Colour: light yellow
b)	Odour	characteristic
c)	Odour Threshold	No data available
d)	pH	5.5
e)	Melting point/freezing point	Melting point/range: 68 - 70 °C (154 - 158 °F) - lit.
f)	Initial boiling point and boiling range	255 °C (491 °F) - lit.
g)	Flash point	110 °C (230 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	The product is not flammable. - Flammability (solids)
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 5.8 %(V) Lower explosion limit: 0.6 %(V)
k)	Vapour pressure	0.04 hPa (0.03 mmHg) at 20 °C (68 °F) 5.5 hPa (4.1 mmHg) at 100 °C (212 °F) 12.6 hPa (9.5 mmHg) at 115 °C (239 °F) 95.7 hPa (71.8 mmHg) at 166 °C (331 °F)
l)	Vapour density	No data available
m)	Relative density	0.992 g/cm3
n)	Water solubility	0.0075 g/l at 15 °C (59 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 4.008 at 25 °C (77 °F)
p)	Auto-ignition temperature	566 °C (1,051 °F) at 1,013.0 hPa (759.8 mmHg)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
Inhalation: No data available

LD50 Dermal - Rabbit - > 5,010 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Irritating to skin. - 24 h
(Draize Test)

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
Maximisation Test (GPMT) - Guinea pig
Does not cause skin sensitisation.
(OECD Test Guideline 406)

Germ cell mutagenicity
Ames test
S. typhimurium
Result: negative

Mouse - male and female
Result: negative

Carcinogenicity

Carcinogenicity - Mouse - Oral
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Lungs, Thorax, or Respiration:Tumors. Blood:Tumors.

Carcinogenicity - Mouse - Subcutaneous
Tumorigenic:Neoplastic by RTECS criteria. Lungs, Thorax, or Respiration:Tumors. Liver:Tumors.

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: DU8050000

Liver injury may occur., Gastrointestinal disturbance

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Pimephales promelas (fathead minnow) - 3 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	flow-through test EC50 - Daphnia magna (Water flea) - 0.36 mg/l - 48 h

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 14 d Result: 84 % - Readily biodegradable (OECD Test Guideline 301C)

12.3 Bioaccumulative potential

Bioaccumulation	Leuciscus idus (Golden orfe) - 3 d - 50 µg/l Bioconcentration factor (BCF): 281

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Biphenyl)
Reportable Quantity (RQ): 100 lbs
Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Biphenyl)
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Biphenyl)

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Biphenyl	92-52-4	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Biphenyl	92-52-4	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Biphenyl	92-52-4	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Biphenyl	92-52-4	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Eye Irrit.	Eye irritation
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	1
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	1
Reactivity Hazard:	0

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.10 Revision Date: 01/28/2016 Print Date: 02/18/2016

SAFETY DATA SHEET

Version 5.3
Revision Date 12/29/2015
Print Date 04/11/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 1,1-Dichloroethane

Product Number : 48512
Brand : Supelco
Index-No. : 602-011-00-1

CAS-No. : 75-34-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Acute toxicity, Oral (Category 4), H302
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H302 Harmful if swallowed.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.

P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Ethylidene chloride
Formula	:	$C_2H_4Cl_2$
Molecular weight	:	98.96 g/mol
CAS-No.	:	75-34-3
EC-No.	:	200-863-5
Index-No.	:	602-011-00-1

Hazardous components

Component	Classification	Concentration
1,1-Dichloroethane		
	Flam. Liq. 2; Acute Tox. 4; Eye Irrit. 2A; STOT SE 3; Aquatic Acute 3; Aquatic Chronic 3; H225, H302, H319, H335, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
1,1-Dichloroethane	75-34-3	TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation Eye irritation Liver damage Kidney damage Not classifiable as a human carcinogen		
		TWA	100.000000 ppm 400.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		See Appendix C		
		TWA	100.000000 ppm 400.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 60 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering

controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	-97.99 °C (-144.38 °F)
f)	Initial boiling point and boiling range	55.0 - 58.0 °C (131.0 - 136.4 °F)
g)	Flash point	-9.99 °C (14.02 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.17 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 725.0 mg/kg

LC50 Inhalation - Rat - 4 h - 13000 ppm

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
Chronic exposure may cause dermatitis.

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: KI0175000

Liver injury may occur., Kidney injury may occur., narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Central nervous system -

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2362 Class: 3 Packing group: II
Proper shipping name: 1,1-Dichloroethane
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 2362 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: 1,1-DICHLOROETHANE

IATA
UN number: 2362 Class: 3 Packing group: II
Proper shipping name: 1,1-Dichloroethane

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
1,1-Dichloroethane	75-34-3	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,1-Dichloroethane	75-34-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,1-Dichloroethane	75-34-3	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
1,1-Dichloroethane	75-34-3	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
1,1-Dichloroethane	75-34-3	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H302	Harmful if swallowed.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.3 Revision Date: 12/29/2015 Print Date: 04/11/2016

SAFETY DATA SHEET

Version 6.7
Revision Date 08/05/2024
Print Date 08/06/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : 1,2,4,5-Tetramethylbenzene

Product Number : T19607
Brand : Aldrich
CAS-No. : 95-93-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable solids (Category 1), H228
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Danger

Hazard Statements

H228	Flammable solid.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary Statements

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Durene
1,2,4,5-Tetramethylbenzene

Formula : $C_{10}H_{14}$
Molecular weight : 134.22 g/mol
CAS-No. : 95-93-2
EC-No. : 202-465-7

Component	Classification	Concentration
1,2,4,5-tetramethylbenzene		
	Flam. Sol. 1; Aquatic Acute 1; Aquatic Chronic 1; H228, H400, H410 M-Factor - Aquatic Acute: 1 - Aquatic Chronic: 1	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 4: First aid measures

4.1 Description of first-aid measures
No data available

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
No data available

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.

5.3 Advice for firefighters
No data available

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
For personal protection see section 8.

6.2 Environmental precautions
No data available

6.3 Methods and materials for containment and cleaning up
No data available

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
No data available

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Skin protection
Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Control of environmental exposure
Prevent product from entering drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: crystals
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 76 - 80 °C (169 - 176 °F) - lit.
f)	Initial boiling point and boiling range	191 - 193 °C 376 - 379 °F
g)	Flash point	74 °C (165 °F) - closed cup - c.c.
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	The substance or mixture is a flammable solid with the category 1.
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available

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m)	Density	0.838 g/mL at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	Not classified as explosive.
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
No data available

10.3 Possibility of hazardous reactions
Violent reactions possible with:
Oxidizing agents

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 6,700 mg/kg
Remarks: (RTECS)
Inhalation: No data available
Dermal: No data available

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Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: DC0500000
The data available to us do not suffice to permit any industrial-toxicological assessment.

Further toxicological data:

Risk of absorption.

Other dangerous properties can not be excluded.

Further data:

Handle in accordance with good industrial hygiene and safety practice.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LC0 - Leuciscus idus (Golden orfe) - 10 mg/l - 48 h Remarks: (ECOTOX Database)

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LC50 - Leuciscus idus (Golden orfe) - 30 mg/l - 48 h
Remarks: (ECOTOX Database)

LC100 - Leuciscus idus (Golden orfe) - 50 mg/l - 48 h
Remarks: (ECOTOX Database)

Toxicity to daphnia and other aquatic invertebrates: EC50 - Daphnia magna (Water flea) - 0.47 mg/l - 48 h
Remarks: (External MSDS)

12.2 Persistence and degradability
Not readily biodegradable.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
Discharge into the environment must be avoided.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
No data available

SECTION 14: Transport information

DOT (US)
UN number: 1325 Class: 4.1 Packing group: II
Proper shipping name: Flammable solids, organic, n.o.s. (1,2,4,5-tetramethylbenzene)
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 1325 Class: 4.1 Packing group: II EMS-No: F-A, S-G

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Proper shipping name: FLAMMABLE SOLID, ORGANIC, N.O.S. (1,2,4,5-tetramethylbenzene)
Marine pollutant : yes

IATA
UN number: 1325 Class: 4.1 Packing group: II
Proper shipping name: Flammable solid, organic, n.o.s. (1,2,4,5-tetramethylbenzene)

SECTION 15: Regulatory information

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Fire Hazard

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

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SECTION 16: Other information

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.7 Revision Date: 08/05/2024 Print Date: 08/06/2024

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M A T E R I A L S A F E T Y D A T A S H E E T

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

Company: AccuStandard, Inc.
125 Market Street
New Haven, CT 06513

Date MSDS Printed: 4/21/2006
Preparation Date: 4/21/2006
Information Phone Number: 203-786-5290
Emergency Phone Number: 203-786-5290
Hours: Mon. to Fri. 8am-5pm EDT

MSDS Number: V-029
Product Name: 1,2,4-Trimethylbenzene
Synonyms: 1,2,4-Trimethylbenzene; Pseudocumene; psi-Cumene; Assymetrical trimethylbenzene
Formula: C_9H_{12} Molecular Weight: 120.19

SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS

Component(s) (1)	CAS #	Appr. %	ACGIH-TLV (mg/m3) TWA	ACGIH-TLV (mg/m3) STEL skin	OSHA-PEL (mg/m3) TWA	OSHA-PEL (mg/m3) STEL skin
1,2,4-Trimethylbenzene	95-63-6	100	123			

SECTION 3 - HAZARDS IDENTIFICATION

Symptoms of Exposure:

Irritating to eyes, skin, mucous membranes and upper respiratory system.

Narcotic in high concentrations.

May cause headache, dizziness, nausea, and narcosis.

May cause stomach cramps and gastro-intestinal disturbances.

To the best of our knowledge the chemical, physical and toxicological properties of the component ingredients have not been thoroughly investigated.

Potential Health Effects:

Harmful if inhaled.

May be harmful if absorbed through skin or swallowed

May cause central nervous system damage.

Routes of Entry:

Inhalation, ingestion or skin contact.

Carcinogenicity:

This product is or contains a component that is not listed (ACGIH, IARC, NTP, OSHA) as a cancer causing agent.

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SECTION 4 - FIRST AID MEASURES

Emergency First Aid:

Get medical assistance for all cases of overexposure.

Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.

Eye contact: Immediately flush with plenty of water. After initial flushing, remove and contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers.

Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek immediate medical attention.

Ingestion: Call a physician or poison control center immediately. ONLY induce vomiting at the instructions of a physician. Never give anything by mouth to an unconscious person.

SECTION 5 - FIRE FIGHTING MEASURES

Flammable Properties:

Flash Point: 118.4 °F (48 °C) (cc)

Flammable Limits LEL (%): 0.9

Flammable Limits UEL (%): 6.4

Autoignition Temperature: 515 °C

Flammable liquid and vapor.

Vapors can travel to a source of ignition and flash back.

Containers can build up pressure if exposed to heat.

During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media:

Use alcohol foam, carbon dioxide, dry chemical, or water spray when fighting fires involving this material.

Fire Fighting Procedures:

As in any fire, wear self-contained breathing apparatus pressure demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Spill Response:

Wear a self-contained breathing apparatus and appropriate Personal protection. Stop leak if you can do so without risk. Ventilate area. Neutralize spill with soda ash or lime. Take up and containerize for proper disposal. Flush spill area with water. Keep combustibles away from spilled material. Comply with Federal, State, and local regulations.

SECTION 7 - HANDLING AND STORAGE

Store in a tighly closed container.

Store in a cool area away from ignition sources and oxidizers.

Do not breathe vapor.

Do not get in eyes, on skin or clothing.

Avoid prolonged or repeated exposure.

This product should only by used by persons trained in the safe handling of hazardous chemicals.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls and Personal Protection Equipment (PPE):

Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), a NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other

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NIOSH/MSHA respirators (negative pressure type) under specified conditions (see your safety equipment supplier). Engineering and/or administrative controls should be implemented to reduce exposure.

Material should be handled or transferred in an approved fume hood or with adequate ventilation.

Compatible chemical-resistant protective gloves must be worn to prevent skin contact.

Safety glasses with side shields must be worn at all times.

General Hygiene Considerations:

Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear, colorless liquid
Odor: Aromatic
pH: N/A
Vapor Pressure: 7 mmHg (44.4 °C)
Vapor Density (Air = 1): 4.2 g/l
Boiling Point: 168 - 169 °C
Melting Point: -43.7 °C
Solubility in Water (%): Insoluble
Specific Gravity (H_2O = 1): 0.876 g/cm3
Flash Point: 118.4 °F (48 °C) (cc)
Explosion Limits (%): 0.9 to 6.4
Autoignition Temperature: 515 °C
Percent Volatile: N/A
Evaporation Rate (BuAc = 1): N/A
Molecular Weight: 120.19
Molecular Formula: C_9H_{12}

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable
Conditions To Avoid: Heat; Contact with ignition sources
Materials To Avoid: Oxidizers

Hazardous Decomposition: Carbon oxides
Hazardous Polymerization: Will not occur

SECTION 11 - TOXICOLOGICAL INFORMATION

See section 3 for specific toxicological information for the ingredients of this product.

SECTION 12 - ECOLOGICAL INFORMATION

By complying with sections 6 and 7 there will be no release to the environment.

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SECTION 13 - DISPOSAL CONSIDERATIONS

Recycle or incinerate at any EPA approved facility or dispose in compliance with Federal, State and local regulations. Empty containers must be triple-rinsed prior to disposal.

SECTION 14 - TRANSPORT INFORMATION

DOT UN Number: UN3295 Shipping Class: 3 Packing Group: III FLAMMABLE

SECTION 15 - REGULATORY INFORMATION

In addition to Federal and state regulations, local regulations may apply. Check with your local regulatory authorities.

SECTION 16 - OTHER INFORMATION

This document has been designed to meet the requirements of OSHA, ANSI and CHIPs regulations.

The statements contained herein are offered for informational purposes only and are based on technical data that we believe to be accurate. It is intended for use only by persons having the necessary technical skill and at their own discretion and risk. Since conditions and manner of use are outside our control, we make
NO WARRANTY, EXPRESSED OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE.

Legend : N/A = Not Available ND = Not Determined NR = Not Regulated

* * * End of Document * * *

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SAFETY DATA SHEET

Version 4.7
Revision Date 11/26/2015
Print Date 02/11/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 1,2-Dichlorobenzene

Product Number : 240664
Brand : Sigma-Aldrich
Index-No. : 602-034-00-7

CAS-No. : 95-50-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 4), H227
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 4), H332
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Skin sensitisation (Category 1), H317
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H227 Combustible liquid.
H302 + H332 Harmful if swallowed or if inhaled
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.

H335	May cause respiratory irritation.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P272	Contaminated work clothing should not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_6H_4Cl_2$
Molecular weight	:	147.00 g/mol
CAS-No.	:	95-50-1
EC-No.	:	202-425-9
Index-No.	:	602-034-00-7

Hazardous components

Component	Classification	Concentration
1,2-Dichlorobenzene		
	Flam. Liq. 4; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; Skin Sens. 1; STOT SE 3; Aquatic Acute 1; Aquatic Chronic 1; H227, H302 + H332, H315, H317, H319, H335, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Light sensitive.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
1,2-Dichlorobenzene	95-50-1	TWA	25.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation Eye irritation Liver damage Not classifiable as a human carcinogen		
		TWA	25 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Eye irritation Liver damage Not classifiable as a human carcinogen		
		STEL	50.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Eye irritation Liver damage Not classifiable as a human carcinogen		
		STEL	50 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Eye irritation Liver damage Not classifiable as a human carcinogen		
		C	50.000000 ppm 300.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate. Ceiling limit is to be determined from breathing-zone air samples.		
		C	50.000000 ppm 300.000000 mg/m3	USA. NIOSH Recommended Exposure Limits

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 38 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -18 - -17 °C (0 - 1 °F) - lit.
f)	Initial boiling point and boiling range	178 - 180 °C (352 - 356 °F) - lit.
g)	Flash point	66.0 °C (150.8 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 9.2 %(V) Lower explosion limit: 2.2 %(V)
k)	Vapour pressure	2.1 hPa (1.6 mmHg) at 35.0 °C (95.0 °F) 1.6 hPa (1.2 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.306 g/cm3 at 25 °C (77 °F)
n)	Water solubility	ca.0.1558 g/l at 25 °C (77 °F) - partly soluble
o)	Partition coefficient: n-octanol/water	log Pow: ca.3.433 at 25 °C (77 °F)
p)	Auto-ignition temperature	648.0 °C (1,198.4 °F)
q)	Decomposition	No data available

temperature

r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	ca.36.61 mN/m

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 500.0 mg/kg

Inhalation: No data available

LD50 Dermal - Rabbit - > 10,000 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
(OECD Test Guideline 404)

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
in vivo assay - Mouse
May cause sensitisation by skin contact.
(OECD Test Guideline 429)

Germ cell mutagenicity
No data available

Ames test
Salmonella typhimurium
Result: negative

OECD Test Guideline 474
Mouse - male - Bone marrow
Result: negative

Carcinogenicity

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (1,2-Dichlorobenzene)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure

Aspiration hazard
No data available

Additional Information

Repeated dose toxicity	Rat - male and female - Oral - 24 h - NOAEL : 60 mg/kg - LOAEL : 125 mg/kg - OECD Test Guideline 408

RTECS: CZ4500000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Oncorhynchus mykiss (rainbow trout) - 1.58 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Ceriodaphnia dubia (water flea) - 0.66 mg/l - 48 h
Toxicity to algae	Growth inhibition EC50 - Pseudokirchneriella subcapitata - 2.2 mg/l - 96 h

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 0 % - Not readily biodegradable. (OECD Test Guideline 301C)

12.3 Bioaccumulative potential

Bioaccumulation	Cyprinus carpio (Carp) - 56 d - 0.01 mg/l Bioconcentration factor (BCF): 90 - 260 (OECD Test Guideline 305C)

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1591 Class: 6.1 Packing group: III
Proper shipping name: o-Dichlorobenzene
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1591 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: ortho-DICHLOROBENZENE
Marine pollutant:yes

IATA
UN number: 1591 Class: 6.1 Packing group: III
Proper shipping name: o-Dichlorobenzene

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
1,2-Dichlorobenzene	95-50-1	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,2-Dichlorobenzene	95-50-1	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,2-Dichlorobenzene	95-50-1	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
1,2-Dichlorobenzene	95-50-1	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox. Acute toxicity

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H227	Combustible liquid.
H302	Harmful if swallowed.
H302 + H332	Harmful if swallowed or if inhaled
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	2
Physical Hazard	1

NFPA Rating

Health hazard:	2
Fire Hazard:	2
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.7 Revision Date: 11/26/2015 Print Date: 02/11/2016

SAFETY DATA SHEET

Creation Date 04-Feb-2010 **Revision Date** 18-Jan-2018 **Revision Number** 6

1. Identification

Product Name **1,2-Dichloroethane**

Cat No. : **E175-4; E175-20; E175-500; E175RS-19; E175RS-50; E190-4**

CAS-No 107-06-2
Synonyms Ethylene dichloride; Ethylene chloride (Certified ACS/Spectranalyzed)

Recommended Use Laboratory chemicals.
Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 2
Acute oral toxicity	Category 4
Acute Inhalation Toxicity - Vapors	Category 3
Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Carcinogenicity	Category 1B
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system, Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, Heart, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Highly flammable liquid and vapor
Harmful if swallowed
Causes skin irritation
Causes serious eye irritation

Toxic if inhaled
May cause respiratory irritation
May cause drowsiness or dizziness
May cause cancer
May cause damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Wear eye/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Keep cool
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician
Skin
If skin irritation occurs: Get medical advice/attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)

WARNING. Cancer - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Ethylene dichloride	107-06-2	>95

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately.

Most important symptoms and effects Breathing difficulties. May cause cardiac arrhythmia. May cause central nervous system depression: Symptoms may include tightness in the chest, flushing, headache, nausea, vomiting, respiratory depression, weakness, irregular heartbeat, abdominal pain, convulsions, and shock

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Cool closed containers exposed to fire with water spray.

Unsuitable Extinguishing Media Water may be ineffective

Flash Point 13 °C / 55.4 °F

Method - No information available

Autoignition Temperature 440 °C / 824 °F

Explosion Limits

Upper 15.9 vol %
Lower 6.2 vol %
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Flammable. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Keep product and empty container away from heat and sources of ignition. Thermal decomposition can lead to release of irritating gases and vapors.

Hazardous Combustion Products
Carbon monoxide (CO) Carbon dioxide (CO_2) Hydrogen chloride gas Phosgene
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
3	3	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions Should not be released into the environment. See Section 12 for additional ecological information.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Do not ingest. Use only under a chemical fume hood. Do not breathe vapors or spray mist. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded. Take precautionary measures against static discharges.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Ethylene dichloride	TWA: 10 ppm	(Vacated) TWA: 1 ppm (Vacated) TWA: 4 mg/m³ Ceiling: 100 ppm (Vacated) STEL: 2 ppm (Vacated) STEL: 8 mg/m³ TWA: 50 ppm	IDLH: 50 ppm TWA: 1 ppm TWA: 4 mg/m³ STEL: 2 ppm STEL: 8 mg/m³	TWA: 10 ppm TWA: 40 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Use only under a chemical fume hood. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166. Tightly fitting safety goggles. Face-shield.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	sweet
Odor Threshold	400 ppm
pH	No information available
Melting Point/Range	-35 °C / -31 °F
Boiling Point/Range	81 - 85 °C / 177.8 - 185 °F
Flash Point	13 °C / 55.4 °F
Evaporation Rate	6.5 (Butyl Acetate = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	15.9 vol %
Lower	6.2 vol %
Vapor Pressure	65 mmHg @ 29 °C
Vapor Density	3.4
Specific Gravity	1.250
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	440 °C / 824 °F
Decomposition Temperature	No information available
Viscosity	0.8 mPa s at 20 °C
Molecular Formula	C2 H4 Cl2
Molecular Weight	98.96

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Keep away from open flames, hot surfaces and sources of ignition.

Incompatible Materials Strong oxidizing agents, Bases, Alkali metals

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2), Hydrogen chloride gas, Phosgene

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Ethylene dichloride	625 mg/kg (Rat) 413 mg/kg (Mouse)	2800 mg/kg (Rabbit)	28.79 mg/L (Rat) 1h 7.8 mg/l (Rat) 4h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes, respiratory system and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Ethylene dichloride	107-06-2	Group 2B	Reasonably Anticipated	Not listed	X	Not listed

IARC: (International Agency for Research on Cancer)

NTP: (National Toxicity Program)

IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans
NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system Central nervous system (CNS)
STOT - repeated exposure Kidney Liver Heart Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed May cause central nervous system depression: Symptoms may include tightness in the chest, flushing, headache, nausea, vomiting, respiratory depression, weakness, irregular heartbeat, abdominal pain, convulsions, and shock

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity
Do not empty into drains.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Ethylene dichloride	EC50: = 166 mg/L, 96h static (Desmodesmus subspicatus) EC50: > 433 mg/L, 96h (Pseudokirchneriella subcapitata)	LC50: 110 - 123 mg/L, 96h flow-through (Pimephales promelas) LC50: 230 - 710 mg/L, 96h flow-through (Lepomis macrochirus) LC50: = 225 mg/L, 96h static (Oncorhynchus mykiss)	Not listed	EC50: 140 - 190 mg/L, 48h Static (Daphnia magna)

Persistence and Degradability Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility.

Component	log Pow
Ethylene dichloride	1.45

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Ethylene dichloride - 107-06-2	U077	-

14. Transport information

DOT

UN-No	UN1184
Proper Shipping Name	ETHYLENE DICHLORIDE
Hazard Class	3
Subsidiary Hazard Class	6.1
Packing Group	II

TDG

UN-No	UN1184
Proper Shipping Name	ETHYLENE DICHLORIDE
Hazard Class	3
Subsidiary Hazard Class	6.1
Packing Group	II

IATA

UN-No	UN1184
Proper Shipping Name	ETHYLENE DICHLORIDE
Hazard Class	3
Subsidiary Hazard Class	6.1
Packing Group	II

IMDG/IMO

UN-No	UN1184
Proper Shipping Name	ETHYLENE DICHLORIDE
Hazard Class	3
Subsidiary Hazard Class	6.1
Packing Group	II

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Ethylene dichloride	X	X	-	203-458-1	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b)

Component	TSCA 12(b)
Ethylene dichloride	Section 4

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Ethylene dichloride	107-06-2	>95	0.1

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Ethylene dichloride	X	100 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Ethylene dichloride	X		-

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Ethylene dichloride	100 lb 1 lb	-

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Ethylene dichloride	107-06-2	Carcinogen	10 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Ethylene dichloride	X	X	X	X	-

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade Serious risk, Grade 3

16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 04-Feb-2010
Revision Date 18-Jan-2018
Print Date 18-Jan-2018
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Version 5.4
Revision Date 12/01/2015
Print Date 02/18/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 1,2-Dichloroethylene, mixture of *cis* and *trans*

Product Number : D62403
Brand : Aldrich
Index-No. : 602-026-00-3

CAS-No. : 540-59-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 4), H332
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H302 + H332 Harmful if swallowed or if inhaled
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.

P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312	Call a POISON CENTER or doctor/ physician if you feel unwell.
P330	Rinse mouth.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_2H_2Cl_2$
Molecular weight	:	96.94 g/mol
CAS-No.	:	540-59-0
EC-No.	:	208-750-2
Index-No.	:	602-026-00-3

Hazardous components

Component	Classification	Concentration
1,2-Dichloroethylene		
	Flam. Liq. 2; Acute Tox. 4; Aquatic Acute 3; Aquatic Chronic 3; H225, H302 + H332, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Air, light, and moisture sensitive.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
1,2-Dichloroethylene	540-59-0	TWA	200.000000 ppm 790.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	200.000000 ppm 790.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Remarks	The value in mg/m3 is approximate.		
		TWA	200.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Eye irritation		
		TWA	200.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Eye irritation		
		TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Eye irritation		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance — Form: liquid
Colour: colourless

b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -57 °C (-71 °F) - lit.
f)	Initial boiling point and boiling range	48 - 60 °C (118 - 140 °F) - lit.
g)	Flash point	6 °C (43 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.265 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

10.5 Incompatible materials
Strong oxidizing agentsOxidizing agents, Bases

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 770 mg/kg

Dermal: No data available

No data available

Skin corrosion/irritation
Skin - Rabbit

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: KV9360000

prolonged or repeated exposure can cause:, narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Lepomis macrochirus (Bluegill) - 140.0 mg/l - 96.0 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene

Poison Inhalation Hazard: No

IMDG

UN number: 1150 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: 1,2-DICHLOROETHYLENE

IATA

UN number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
1,2-Dichloroethylene	540-59-0	2007-07-01

SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,2-Dichloroethylene	540-59-0	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,2-Dichloroethylene	540-59-0	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
1,2-Dichloroethylene	540-59-0	2007-07-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H302	Harmful if swallowed.
H302 + H332	Harmful if swallowed or if inhaled

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	1
Fire Hazard:	3
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.4 Revision Date: 12/01/2015 Print Date: 02/18/2016

SAFETY DATA SHEET

Version 8.2
Revision Date 04/18/2021
Print Date 07/25/2021

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : 1,2-Dichlorotetrafluoroethane

Product Number : 295248
Brand : Aldrich
CAS-No. : 76-14-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Gases under pressure (Liquefied gas), H280
Simple Asphyxiant,
Hazardous to the ozone layer (Category 1), H420

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H280 Contains gas under pressure; may explode if heated.

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	May displace oxygen and cause rapid suffocation.
H420	Harms public health and the environment by destroying ozone in the upper atmosphere.

Precautionary statement(s)

P410 + P403	Protect from sunlight. Store in a well-ventilated place.
P502	Refer to manufacturer/ supplier for information on recovery/ recycling.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	CFC-114
Formula	:	$C_2Cl_2F_4$
Molecular weight	:	170.92 g/mol
CAS-No.	:	76-14-2
EC-No.	:	200-937-7

Component	Classification	Concentration
Cryofluorane		
	Press. Gas Liquefied gas; SA ; Ozone 1; H280, , H420	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Consult a physician. Show this material safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

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4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas
Hydrogen fluoride

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Clean up promptly by sweeping or vacuum.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place.

Contents under pressure.
Storage class (TRGS 510): 2A: Gases

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

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SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Cryofluorane	76-14-2	TWA	1,000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not classifiable as a human carcinogen		
		TWA	1,000 ppm 7,000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1,000 ppm 7,000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	1,000 ppm 7,000 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		PEL	1,000 ppm 7,000 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Do not let product enter drains.

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SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Liquefied gas
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -94 °C (-137 °F) - lit.
f)	Initial boiling point and boiling range	3.8 °C 38.8 °F - lit.
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	1,902.5 hPa at 20.0 °C (68.0 °F)
l)	Vapor density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

SECTION 10: Stability and reactivity

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

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10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Powdered metals

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

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Aspiration hazard
No data available

11.2 Additional Information
RTECS: KI1101000

prolonged or repeated exposure can cause:, narcosis

Heart -

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
UN number: 1958 Class: 2.2
Proper shipping name: 1,2-Dichloro-1,1,2,2-tetrafluoroethane
Reportable Quantity (RQ): 10 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1958 Class: 2.2 EMS-No: F-C, S-V
Proper shipping name: 1,2-DICHLORO-1,1,2,2-TETRAFLUOROETHANE

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IATA
UN number: 1958 Class: 2.2
Proper shipping name: 1,2-Dichloro-1,1,2,2-tetrafluoroethane

SECTION 15: Regulatory information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Cryofluorane	76-14-2	2007-07-01

Reportable Quantity : F001 lbs

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Cryofluorane	76-14-2	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Cryofluorane	76-14-2	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Cryofluorane	76-14-2	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

SECTION 16: Other information

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the

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information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 8.2 Revision Date: 04/18/2021 Print Date: 07/25/2021

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Material Safety Data Sheet

Version 3.1
Revision Date 04/08/2011
Print Date 12/27/2011

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	1,3,5-Trimethylbenzene
Product Number	:	442236
Brand	:	Supelco
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Combustible Liquid, Target Organ Effect, Irritant

Target Organs

Peripheral nervous system., Central nervous system, Blood

GHS Classification
Flammable liquids (Category 3)
Acute toxicity, Inhalation (Category 5)
Skin irritation (Category 2)
Eye irritation (Category 2B)
Specific target organ toxicity - single exposure (Category 3)
Acute aquatic toxicity (Category 2)
Chronic aquatic toxicity (Category 2)

GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)

H226	Flammable liquid and vapour.
H315 + H320	Causes skin and eye irritation.
H333	May be harmful if inhaled.
H335	May cause respiratory irritation.
H411	Toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P273	Avoid release to the environment.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

HMIS Classification

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	2
Physical hazards:	0

NFPA Rating

Health hazard:	2
Fire:	2
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : Mesitylene
1,3,5-Trimethylbenzene

Formula : C_9H_{12}

Molecular Weight : 120.19 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
Mesitylene			
108-67-8	203-604-4	601-025-00-5	-

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Mesitylene	108-67-8	TWA	25 ppm 125 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	25 ppm 123 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		TWA	25 ppm 125 mg/m3	USA. NIOSH Recommended Exposure Limits

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
impervious clothing, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid, clear

Colour	colourless

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: -45 °C (-49 °F) - lit.
Boiling point	163 - 166 °C (325 - 331 °F) - lit.
Flash point	53.0 °C (127.4 °F) - closed cup
Ignition temperature	550 °C (1,022 °F)
Autoignition temperature	550.0 °C (1,022.0 °F)
Lower explosion limit	0.88 %(V)
Vapour pressure	18.7 hPa (14.0 mmHg) at 55.0 °C (131.0 °F) 3.3 hPa (2.5 mmHg) at 25.0 °C (77.0 °F)
Density	0.864 g/cm3 at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
no data available

Conditions to avoid
Heat, flames and sparks.

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
Inhalation LC50
LC50 Inhalation - rat - 4 h - 24,000 mg/m3

Dermal LD50
no data available

Other information on acute toxicity
no data available

Skin corrosion/irritation
Skin - rabbit - Skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Mild eye irritation - 24 h

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
May cause respiratory irritation.

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information
RTECS: OX6825000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Carassius auratus (goldfish) - 12.52 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates.	Immobilization EC50 - Daphnia magna (Water flea) - 6 mg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

Toxic to aquatic life with long lasting effects.

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2325 Class: 3 Packing group: III
Proper shipping name: 1,3,5-Trimethylbenzene
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 2325 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: 1,3,5-TRIMETHYLBENZENE
Marine pollutant: No

IATA
UN number: 2325 Class: 3 Packing group: III
Proper shipping name: 1,3,5-Trimethylbenzene

15. REGULATORY INFORMATION

OSHA Hazards
Combustible Liquid, Target Organ Effect, Irritant

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Mesitylene	108-67-8	1994-04-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Mesitylene	108-67-8	1994-04-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Mesitylene	108-67-8	1994-04-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
Copyright 2011 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

SAFETY DATA SHEET

Version 4.6
Revision Date 03/03/2015
Print Date 03/03/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 1,3-Butadiene

Product Number : 295035
Brand : Aldrich
Index-No. : 601-013-00-X

CAS-No. : 106-99-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable gases (Category 1), H220
Gases under pressure (Liquefied gas), H280
Germ cell mutagenicity (Category 1B), H340
Carcinogenicity (Category 1A), H350

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H220 Extremely flammable gas.
H280 Contains gas under pressure; may explode if heated.
H340 May cause genetic defects.
H350 May cause cancer.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P281 Use personal protective equipment as required.

P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381	Eliminate all ignition sources if safe to do so.
P405	Store locked up.
P410 + P403	Protect from sunlight. Store in a well-ventilated place.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	C_4H_6
Molecular weight	:	54.09 g/mol
CAS-No.	:	106-99-0
EC-No.	:	203-450-8
Index-No.	:	601-013-00-X

Hazardous components

Component	Classification	Concentration
1,3-Butadiene		
	Flam. Gas 1; Press. Gas Liquefied gas; Muta. 1B; Carc. 1A; H220, H280, H340, H350	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Clean up promptly by sweeping or vacuum.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature 2 - 8 °C

Contents under pressure. Air sensitive. Light sensitive. Shock or heat may detonate May explode when heated. Handle and store under inert gas.
Storage class (TRGS 510): Gases

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Potential Occupational Carcinogen See Appendix A		
1,3-Butadiene	106-99-0	TWA	2 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Cancer Suspected human carcinogen		
		TWA	2.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Cancer Suspected human carcinogen		
		TWA	1 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Substance listed; for more information see OSHA document 29 CFR 1910.1051; 29 CFR 1910.19(1)		
		TWA	1.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Substance listed; for more information see OSHA document 29 CFR 1910.1051; 29 CFR 1910.19(1)		

		STEL	5 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Substance listed; for more information see OSHA document 29 CFR 1910.1051; 29 CFR 1910.19(1)		
		STEL	5.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Substance listed; for more information see OSHA document 29 CFR 1910.1051; 29 CFR 1910.19(1)		
		See 1910.1051		
		PEL	1.000000 ppm	OSHA Specifically Regulated Chemicals/Carcinogens
		1910.1051 This section applies to all occupational exposures to 1,3-Butadiene (BD), Chemical Abstracts Service Registry No. 106-99-0, except as provided in paragraph (a)(2) of this section. Except for the recordkeeping provisions in paragraph (m)(1) of this section, this section does not apply to the processing, use, or handling of products containing BD or to other work operations and streams in which BD is present where objective data are reasonably relied upon that demonstrate the work operation or the product or the group of products or operations to which it belongs may not reasonably be foreseen to release BD in airborne concentrations at or above the action level or in excess of the STEL under the expected conditions of processing, use, or handling that will cause the greatest possible release or in any plausible accident. This section also does not apply to work operations, products or streams where the only exposure to BD is from liquid mixtures containing 0.1% or less of BD by volume or the vapors released from such liquids, unless objective data become available that show that airborne concentrations generated by such mixtures can exceed the action level or STEL under reasonably predictable conditions of processing, use or handling that will cause the greatest possible release. Except for labeling requirements and requirements for emergency response, this section does not apply to the storage, transportation, distribution or sale of BD or liquid mixtures in intact containers or in transportation pipelines sealed in such a manner as to fully contain BD vapors or liquid. Where products or processes containing BD are exempted under paragraph (a)(2) of this section, the employer shall maintain records of the objective data supporting that exemption and the basis for the employer's reliance on the data, as provided in paragraph (m)(1) of this section 1,3-Butadiene means an organic compound with chemical formula CH2=CH-CH=CH2 that has a molecular weight of approximately 54.15 g/mole OSHA specifically regulated carcinogen		
		STEL	5.000000 ppm	OSHA Specifically Regulated Chemicals/Carcinogens
		1910.1051 This section applies to all occupational exposures to 1,3-Butadiene (BD), Chemical Abstracts Service Registry No. 106-99-0, except as provided in paragraph (a)(2) of this section. Except for the recordkeeping provisions in paragraph (m)(1) of this section, this section does not apply to the processing, use, or handling of products containing BD or to other work operations and streams in which BD is present where objective data are reasonably relied upon that demonstrate the work operation or the product or the group of products or operations to which it belongs may not reasonably be foreseen to release BD in airborne concentrations at or above the		

		action level or in excess of the STEL under the expected conditions of processing, use, or handling that will cause the greatest possible release or in any plausible accident. This section also does not apply to work operations, products or streams where the only exposure to BD is from liquid mixtures containing 0.1% or less of BD by volume or the vapors released from such liquids, unless objective data become available that show that airborne concentrations generated by such mixtures can exceed the action level or STEL under reasonably predictable conditions of processing, use or handling that will cause the greatest possible release. Except for labeling requirements and requirements for emergency response, this section does not apply to the storage, transportation, distribution or sale of BD or liquid mixtures in intact containers or in transportation pipelines sealed in such a manner as to fully contain BD vapors or liquid. Where products or processes containing BD are exempted under paragraph (a)(2) of this section, the employer shall maintain records of the objective data supporting that exemption and the basis for the employer's reliance on the data, as provided in paragraph (m)(1) of this section 1,3-Butadiene means an organic compound with chemical formula CH2=CH-CH=CH2 that has a molecular weight of approximately 54.15 g/mole OSHA specifically regulated carcinogen

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
1,3-Butadiene	106-99-0	1,2 Dihydroxy-4-(N-acetylcysteinyl)-butane	2.5000 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
		Mixture of N-1 and N-2(hydroxybutenyl)valine	2.5pmol/g	Hemoglobin (Hb) adducts in blood	ACGIH - Biological Exposure Indices (BEI)
		Not critical			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Liquefied gas
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -109 °C (-164 °F) - lit.
f)	Initial boiling point and boiling range	-4.5 °C (23.9 °F) - lit.
g)	Flash point	-75.99 °C (-104.78 °F) - closed cup - Tested according to Annex V of Directive 67/548/EEC.
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 16.3 %(V) Lower explosion limit: 1.4 %(V)
k)	Vapour pressure	ca.2,400 hPa (1,800 mmHg) at 20 °C (68 °F) 3,200 hPa (2,400 mmHg) at 30 °C (86 °F) 5,700 hPa (4,275 mmHg) at 50 °C (122 °F)
l)	Vapour density	No data available
m)	Relative density	0.62 g/cm3 at 20 °C (68 °F)
n)	Water solubility	0.5 g/l at 20 °C (68 °F) - Tested according to Annex V of Directive 67/548/EEC.
o)	Partition coefficient: n-octanol/water	log Pow: 1.85 at 23 °C (73 °F)
p)	Auto-ignition temperature	No data available

q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Test for peroxide formation before using or discard after 3 months.
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Oxidizing agents, Oxygen, Copper, Copper alloys, Carbides, Halogens, Metal oxides, Metals

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 5,480 mg/kg

LC50 Inhalation - Rat - 4 h - 285 mg/l

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
In vivo tests showed mutagenic effects

Carcinogenicity

Carcinogenicity - Rat - Inhalation
Tumorigenic:Carcinogenic by RTECS criteria. Cardiac:Tumors. Lungs, Thorax, or Respiration:Tumors.

This is or contains a component that has been reported to be carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Human carcinogen.

IARC: 1 - Group 1: Carcinogenic to humans (1,3-Butadiene)

NTP: Known to be human carcinogen (1,3-Butadiene)

OSHA: OSHA specifically regulated carcinogen (1,3-Butadiene)

Reproductive toxicity
No data available

Reproductive toxicity - Mouse - Inhalation
Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Extra embryonic structures (e.g., placenta, umbilical cord). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

No data available

Developmental Toxicity - Rat - Inhalation
Specific Developmental Abnormalities: Musculoskeletal system.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

Cholinesterase inhibitors can cause heavy salivation and secretion in the lungs, lachrymation, blurred vision, involuntary defecation, diarrhea, tremor, ataxia, sweating, hypothermia, lowered heart rate, and/or a fall in blood pressure as a result of their action at cholinergic nerve sites., narcosis, Headache, Nausea, Vomiting, Dizziness, Drowsiness, Confusion., Weakness, Muscle cramps/spasms., Change in pupil size., Tremors, Seizures., Incoordination., Convulsions, Coma

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - other fish - 71.5 mg/l - 24 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1010 Class: 2.1
Proper shipping name: Butadienes, stabilized
Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1010 Class: 2.1 EMS-No: F-D, S-U
Proper shipping name: BUTADIENES, STABILIZED

IATA
UN number: 1010 Class: 2.1
Proper shipping name: Butadienes, stabilized
IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
1,3-Butadiene	106-99-0	1993-04-24

SARA 311/312 Hazards
Fire Hazard, Sudden Release of Pressure Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,3-Butadiene	106-99-0	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,3-Butadiene	106-99-0	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
1,3-Butadiene	106-99-0	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. 1,3-Butadiene	CAS-No. 106-99-0	Revision Date 2007-09-28
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. 1,3-Butadiene	CAS-No. 106-99-0	Revision Date 2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Carc.	Carcinogenicity
Flam. Gas	Flammable gases
H220	Extremely flammable gas.

H280	Contains gas under pressure; may explode if heated.
H340	May cause genetic defects.
H350	May cause cancer.
Muta.	Germ cell mutagenicity
Press. Gas	Gases under pressure

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	4
Physical Hazard	3

NFPA Rating

Health hazard:	0
Fire Hazard:	4
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.6 Revision Date: 03/03/2015 Print Date: 03/03/2016

SAFETY DATA SHEET

Version 4.7
Revision Date 06/18/2015
Print Date 02/09/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 1,3-Dichlorobenzene

Product Number : 113808
Brand : Aldrich
Index-No. : 602-067-00-7

CAS-No. : 541-73-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 4), H227
Acute toxicity, Oral (Category 4), H302
Acute aquatic toxicity (Category 2), H401
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H227 Combustible liquid.
H302 Harmful if swallowed.
H411 Toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P273 Avoid release to the environment.
P280 Wear protective gloves/ eye protection/ face protection.
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you

	feel unwell. Rinse mouth.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P391	Collect spillage.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_6H_4Cl_2$
Molecular weight	:	147.00 g/mol
CAS-No.	:	541-73-1
EC-No.	:	208-792-1
Index-No.	:	602-067-00-7

Hazardous components

Component	Classification	Concentration
1,3-Dichlorobenzene		
	Flam. Liq. 4; Acute Tox. 4; Aquatic Acute 2; Aquatic Chronic 2; H227, H302, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Combustible liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm

Break through time: 37 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -25 - -22 °C (-13 - -8 °F) - lit.
f)	Initial boiling point and boiling range	172 - 173 °C (342 - 343 °F) - lit.
g)	Flash point	67.0 °C (152.6 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.288 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 5
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available

t) Oxidizing properties No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

LD50 Intraperitoneal - Mouse - 1,062 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (1,3-Dichlorobenzene)

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: CZ4499000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 7.8 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 1.7 mg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Bioaccumulation: Pimephales promelas (fathead minnow) - 32 d - 0.3 mg/l

Bioconcentration factor (BCF): 97

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3082 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, liquid, n.o.s. (1,3-Dichlorobenzene)
Reportable Quantity (RQ): 100 lbs
Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG
UN number: 3082 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (1,3-Dichlorobenzene)
Marine pollutant:yes

IATA
UN number: 3082 Class: 9 Packing group: III

Proper shipping name: Environmentally hazardous substance, liquid, n.o.s. (1,3-Dichlorobenzene)

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
1,3-Dichlorobenzene	541-73-1	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,3-Dichlorobenzene	541-73-1	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,3-Dichlorobenzene	541-73-1	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
1,3-Dichlorobenzene	541-73-1	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Flam. Liq.	Flammable liquids
H227	Combustible liquid.
H302	Harmful if swallowed.
H401	Toxic to aquatic life.

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	
Flammability:	2
Physical Hazard	0

NFPA Rating

Health hazard:	1
Fire Hazard:	2
Reactivity Hazard:	0

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.7 Revision Date: 06/18/2015 Print Date: 02/09/2016

SAFETY DATA SHEET

Version 4.4
Revision Date 04/24/2015
Print Date 04/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 1,4-Dichlorobenzene

Product Number : D56829
Brand : Aldrich
Index-No. : 602-035-00-2

CAS-No. : 106-46-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Eye irritation (Category 2A), H319
Carcinogenicity (Category 2), H351
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H319 Causes serious eye irritation.
H351 Suspected of causing cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P264 Wash skin thoroughly after handling.
P273 Avoid release to the environment.
P280 Wear protective gloves/ eye protection/ face protection.

P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_6H_4Cl_2$
Molecular weight	:	147.00 g/mol
CAS-No.	:	106-46-7
EC-No.	:	203-400-5
Index-No.	:	602-035-00-2

Hazardous components

Component	Classification	Concentration
1,4-Dichlorobenzene		
	Eye Irrit. 2A; Carc. 2; Aquatic Acute 1; Aquatic Chronic 1; H319, H351, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
1,4-Dichlorobenzene	106-46-7	TWA	10.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye irritation Kidney damage Confirmed animal carcinogen with unknown relevance to humans		
		Potential Occupational Carcinogen See Appendix A		
		TWA	75.000000 ppm 450.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: sheets Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 52 - 54 °C (126 - 129 °F) - lit.
f)	Initial boiling point and boiling range	173 °C (343 °F) - lit.
g)	Flash point	66.0 °C (150.8 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	8.8 hPa (6.6 mmHg) at 50.0 °C (122.0 °F) 0.5 hPa (0.4 mmHg) at 25.0 °C (77.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.241 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available

o)	Partition coefficient: n-octanol/water	log Pow: 3.40
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Bulk density	650 kg/m3

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD0 Oral - Rat - male and female - > 2,000 mg/kg
(OECD Test Guideline 401)

LC50 Inhalation - Rat - male and female - 4 h - > 5.07 mg/l

LD0 Dermal - Rat - > 2,000 mg/kg
(OECD Test Guideline 402)

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitisation
Maximisation Test (GPMT) - Guinea pig
Did not cause sensitisation on laboratory animals.
(OECD Test Guideline 406)

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (1,4-Dichlorobenzene)
NTP:	Reasonably anticipated to be a human carcinogen (1,4-Dichlorobenzene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: CZ4550000

Produces:, methemoglobin, Nausea, Vomiting, Increased pulse rate, Headache, Impairment of vision

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Salmo gairdneri - 1.12 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 0.7 mg/l - 48 h
Toxicity to algae	Growth inhibition EC50 - Scenedesmus capricornutum (fresh water algae) - 1.6 mg/l - 96 h

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 30 % - Not rapidly biodegradable (OECD Test Guideline 301C)

12.3 Bioaccumulative potential

Bioaccumulation	Jordanella floridae - 5 d - 2.68 µg/l Bioconcentration factor (BCF): 296

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (1,4-Dichlorobenzene)
Reportable Quantity (RQ): 100 lbs
Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (1,4-Dichlorobenzene)
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (1,4-Dichlorobenzene)

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
1,4-Dichlorobenzene	106-46-7	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,4-Dichlorobenzene	106-46-7	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,4-Dichlorobenzene	106-46-7	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
1,4-Dichlorobenzene	106-46-7	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
1,4-Dichlorobenzene	106-46-7	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
H319	Causes serious eye irritation.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	2
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.4 Revision Date: 04/24/2015 Print Date: 04/01/2016

SAFETY DATA SHEET

Version 5.4
Revision Date 03/03/2015
Print Date 04/11/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 1,4-Dioxane

Product Number : 296309
Brand : Sigma-Aldrich
Index-No. : 603-024-00-5

CAS-No. : 123-91-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Eye irritation (Category 2A), H319
Carcinogenicity (Category 2), H351
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H351 Suspected of causing cancer.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.

P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ eye protection/ face protection.
P281	Use personal protective equipment as required.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

May form explosive peroxides., Repeated exposure may cause skin dryness or cracking.
May form explosive peroxides.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Dioxane Diethylene oxide
Formula	:	$C_4H_8O_2$
Molecular weight	:	88.11 g/mol
CAS-No.	:	123-91-1
EC-No.	:	204-661-8
Index-No.	:	603-024-00-5
Registration number	:	01-2119462837-26-XXXX

Hazardous components

Component	Classification	Concentration
1,4-Dioxane		
	Flam. Liq. 2; Eye Irrit. 2A; Carc. 2; STOT SE 3; H225, H319, H335, H351	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
1,4-Dioxane	123-91-1	TWA	20.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Liver damage Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	20 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Liver damage Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	25 ppm 90 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation		
		TWA	100.000000 ppm 360.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation The value in mg/m3 is approximate.		
		TWA	100 ppm 360 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation The value in mg/m3 is approximate.		
		C	1.000000 ppm 3.600000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A 30 minute ceiling value		

Derived No Effect Level (DNEL)

Application Area	Exposure routes	Health effect	Value
Workers	Inhalation	Long-term local effects	144 mg/m3
Workers	Inhalation	Long-term systemic effects	73 mg/m3
Workers	Skin contact	Long-term systemic effects	21 mg/m3

Predicted No Effect Concentration (PNEC)

Compartment	Value
Soil	0.153 mg/kg
Marine water	0.67 mg/l
Fresh water	10 mg/l
Fresh water sediment	37 mg/kg
Sewage treatment plant	2700 mg/l
Aquatic intermittent release	10 mg/l

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: Chloroprene
Minimum layer thickness: 0.6 mm
Break through time: 35 min
Material tested:Camapren® (KCL 722 / Aldrich Z677493, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	6.0 - 8 at 500 g/l at 20 °C (68 °F)
e)	Melting point/freezing point	Melting point/range: 10 - 12 °C (50 - 54 °F) - lit.
f)	Initial boiling point and boiling range	100 - 102 °C (212 - 216 °F) - lit.
g)	Flash point	12 °C (54 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 22 %(V) Lower explosion limit: 2 %(V)
k)	Vapour pressure	36 hPa (27 mmHg) at 20 °C (68 °F) 53 hPa (40 mmHg) at 25.20 °C (77.36 °F)
l)	Vapour density	3.04 - (Air = 1.0)

m)	Relative density	1.034 g/cm3 at 25 °C (77 °F)
n)	Water solubility	completely miscible
o)	Partition coefficient: n-octanol/water	log Pow: -0.27
p)	Auto-ignition temperature	300 °C (572 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	36.9 mN/m at 25 °C (77 °F)
Relative vapour density	3.04 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.
Test for peroxide formation before distillation or evaporation. Test for peroxide formation or discard after 1 year.
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Oxygen, Oxidizing agents, Halogens, Reducing agents, Perchlorates., Trimethylaluminum

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 4,200 mg/kg

LC50 Inhalation - Rat - 2 h - 46,000 mg/m3
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Other.

LD50 Dermal - Rabbit - 7,858 mg/kg

No data available

Skin corrosion/irritation
Skin - Human
Remarks: Chronic exposure causes drying effect on the skin and eczema.

Skin - Rabbit
Result: No skin irritation

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation - 24 h

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (1,4-Dioxane)
NTP:	Reasonably anticipated to be a human carcinogen (1,4-Dioxane)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: JG8225000

Nausea, Vomiting, Weakness, Dizziness, Vertigo, Headache, Sweating, loss of appetite, Kidney injury may occur., Liver injury may occur.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Liver - Irregularities - Based on Human Evidence
Liver - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 985 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 8,450 mg/l - 24 h
Toxicity to algae	EC50 - Desmodesmus subspicatus (green algae) - > 500 mg/l - 72 h

12.2 Persistence and degradability

Biodegradability	Result: < 5 % - Not readily biodegradable.

12.3 Bioaccumulative potential
Does not bioaccumulate.

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1165 Class: 3 Packing group: II
Proper shipping name: Dioxane
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1165 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: DIOXANE

IATA
UN number: 1165 Class: 3 Packing group: II
Proper shipping name: Dioxane

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
1,4-Dioxane	123-91-1	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,4-Dioxane	123-91-1	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,4-Dioxane	123-91-1	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
1,4-Dioxane	123-91-1	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
1,4-Dioxane	123-91-1	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H351	Suspected of causing cancer.
STOT SE	Specific target organ toxicity - single exposure

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.4 Revision Date: 03/03/2015 Print Date: 04/11/2016

SAFETY DATA SHEET

This safety data sheet was created pursuant to the requirements of:
Regulation (EC) No. 1907/2006 and Regulation (EC) No. 1272/2008

Revision date 02-Jan-2024 **Revision Number** 1

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product Code(s) DRE-C15987125

Product Name 1H,1H,2H,2H-Perfluorooctane sulfonic acid

Form Not applicable

NOTE [8] - No registration number is given for this substance because it is under the threshold in REACH Article 6(1) and not subject to the registration requirements according to REACH Title II

EC No (EU Index No) 248-580-6

CAS No. 27619-97-2

Pure substance/mixture Substance

Formula $C_8H_5F_{13}O_3S$

Molecular weight 428.17

1.2. Relevant identified uses of the substance or mixture and uses advised against

Recommended use Laboratory use

Uses advised against No information available

1.3. Details of the supplier of the safety data sheet

Supplier

LGC Limited
Queens Road
Teddington
Middlesex TW11 0LY
UNITED KINGDOM
:+44 (0) 20 8943 7000
Fax :+44 (0) 20 8943 2767
eMail : gb@lgcstandards.com

Web : www.lgcstandards.com

For further information, please contact

E-mail address sds-request@lgcgroup.com

1.4. Emergency telephone number

Emergency Telephone — For Hazardous Materials or Dangerous Goods Incident
Spill, Leak, Fire Exposure, or Accident
Call CHEMTREC:
USA & Canada 1-800-424-9300
Rest of the world +1 703-741-5970

Emergency Telephone - §45 - (EC)1272/2008	
Europe	**112**
Austria	No information available
Bulgaria	
Croatia	
Cyprus	
Czech Republic	
Denmark	
France	
Hungary	
Ireland	
Italy	
Lithuania	
Luxembourg	
Netherlands	
Norway	
Portugal	
Romania	
Slovakia	
Slovenia	
Spain	
Sweden	
Switzerland	

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to
Regulation (EC) No. 1272/2008 [CLP]

Acute toxicity - Oral	Category 4 - (H302)
Skin corrosion/irritation	Category 1 Sub-category B - (H314)
Serious eye damage/eye irritation	Category 1 - (H318)
Specific target organ toxicity — repeated exposure	Category 2 - (H373)

2.2. Label elements

Contains 1H,1H,2H,2H-Perfluorooctane sulfonic acid



Signal word
Danger

Hazard statements
H302 - Harmful if swallowed
H314 - Causes severe skin burns and eye damage
H373 - May cause damage to organs through prolonged or repeated exposure

Precautionary Statements - EU (§28, 1272/2008)
P260 - Do not breathe dust/fume/gas/mist/vapours/spray
P280 - Wear protective gloves/protective clothing and eye/face protection
P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower]
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor
P331 - Do NOT induce vomiting

2.3. Other hazards

No information available.

This substance does not meet the PBT/vPvB criteria of REACH, annex XIII.

This product does not contain any known or suspected endocrine disruptors.

Chemical name	EU - REACH (1907/2006) - Article 59(1) - Candidate List of Substances of Very High Concern (SVHC) for Authorisation	EU - REACH (1907/2006) - Endocrine Disruptor Assessment List of Substances
1H,1H,2H,2H-Perfluorooctane sulfonic acid	-	-

SECTION 3: Composition/information on ingredients

3.1 Substances

Chemical name	Weight-%	REACH registration number	EC No (EU Index No)	Classification according to Regulation (EC) No. 1272/2008 [CLP]	Specific concentration limit (SCL)	M-Factor	M-Factor (long-term)
1H,1H,2H,2H-Perfluorooctane sulfonic acid 27619-97-2	100	-	248-580-6	Acute Tox. 4 (H302) Skin Corr. 1B (H314) Eye Dam. 1 (H318) STOT RE 2 (H373)			

Full text of H- and EUH-phrases: see section 16

Acute Toxicity Estimate
No information available

This product does not contain candidate substances of very high concern at a concentration >=0.1% (Regulation (EC) No. 1907/2006 (REACH), Article 59)

SECTION 4: First aid measures

4.1. Description of first aid measures

General advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Inhalation Remove to fresh air. If breathing has stopped, give artificial respiration. Get medical attention immediately. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. If breathing is difficult, (trained personnel should) give oxygen. Delayed pulmonary edema may occur. Get immediate medical attention.

Eye contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Keep eye wide open while rinsing. Do not rub affected area. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical attention.

Skin contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get immediate medical attention.

Ingestion Do NOT induce vomiting. Rinse mouth. Never give anything by mouth to an unconscious person. Get immediate medical attention.

Self-protection of the first aider Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination. Avoid contact with skin, eyes or clothing. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Wear personal protective clothing (see section 8).

4.2. Most important symptoms and effects, both acute and delayed

Symptoms	Burning sensation.

4.3. Indication of any immediate medical attention and special treatment needed

Note to doctors	Product is a corrosive material. Use of gastric lavage or emesis is contra-indicated. Possible perforation of stomach or esophagus should be investigated. Do not give chemical antidotes. Asphyxia from glottal edema may occur. Marked decrease in blood pressure may occur with moist rales, frothy sputum, and high pulse pressure.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable Extinguishing Media	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Large Fire	CAUTION: Use of water spray when fighting fire may be inefficient.
Unsuitable extinguishing media	Do not scatter spilled material with high pressure water streams.

5.2. Special hazards arising from the substance or mixture

Specific hazards arising from the chemical	The product causes burns of eyes, skin and mucous membranes. Thermal decomposition can lead to release of irritating gases and vapours.

5.3. Advice for firefighters

Special protective equipment and precautions for fire-fighters	Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions	Attention! Corrosive material. Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Use personal protective equipment as required. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.
Other information	Refer to protective measures listed in Sections 7 and 8.
For emergency responders	Use personal protection recommended in Section 8.

6.2. Environmental precautions

Environmental precautions	Prevent further leakage or spillage if safe to do so. Should not be released into the environment. Do not allow to enter into soil/subsoil. Prevent product from entering drains.

6.3. Methods and material for containment and cleaning up

Methods for containment	Prevent further leakage or spillage if safe to do so.
Methods for cleaning up	Take up mechanically, placing in appropriate containers for disposal.
Prevention of secondary hazards	Clean contaminated objects and areas thoroughly observing environmental regulations.

6.4. Reference to other sections

Reference to other sections	See section 8 for more information. See section 13 for more information.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Advice on safe handling	Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. In case of insufficient ventilation, wear suitable respiratory equipment. Handle product only in closed system or provide appropriate exhaust ventilation. Do not eat, drink or smoke when using this product. Take off contaminated clothing and wash it before reuse.
General hygiene considerations	Avoid contact with skin, eyes or clothing. Do not eat, drink or smoke when using this product. Wash hands before breaks and after work. Wear suitable gloves and eye/face protection. Remove and wash contaminated clothing and gloves, including the inside, before re-use. Contaminated work clothing should not be allowed out of the workplace. Regular cleaning of equipment, work area and clothing is recommended. Wash hands before breaks and immediately after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

Storage Conditions	Keep containers tightly closed in a dry, cool and well-ventilated place. Keep out of the reach of children. Please refer to the manufacturer's certificate for specific storage and transport temperature conditions. Store only in the original receptacle unless other advice is given on the CoA. Protect from moisture. Store locked up. Store away from other materials.

7.3. Specific end use(s)

Risk Management Methods (RMM)	The information required is contained in this Safety Data Sheet.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Exposure Limits This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Biological occupational exposure limits

Chemical name	Latvia	Luxembourg	Romania	Slovakia
1H,1H,2H,2H-Perfluorooctane sulfonic acid 27619-97-2	-	-	5 mg/g Creatinine - urine (Fluorine) - end of shift	-

Derived No Effect Level (DNEL) No information available.
Predicted No Effect Concentration (PNEC) No information available.

8.2. Exposure controls

Personal protective equipment

Eye/face protection Avoid contact with eyes. Wear safety glasses with side shields (or goggles). Tight sealing safety goggles. Face protection shield.

Hand protection Wear suitable gloves. Impervious gloves. The protective gloves to be used must comply with the specifications of EC Directive 89/686/EEC and the related standard EN374. Wear protective nitrile rubber or Viton™ gloves.

Skin and body protection Wear suitable protective clothing. Long sleeved clothing. Chemical resistant apron.

Respiratory protection No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.

General hygiene considerations Avoid contact with skin, eyes or clothing. Do not eat, drink or smoke when using this product. Wash hands before breaks and after work. Wear suitable gloves and eye/face protection. Remove and wash contaminated clothing and gloves, including the inside, before

re-use. Contaminated work clothing should not be allowed out of the workplace. Regular cleaning of equipment, work area and clothing is recommended. Wash hands before breaks and immediately after handling the product.

Environmental exposure controls Do not allow into any sewer, on the ground or into any body of water.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	Solid
Appearance	Solid
Colour	white to brown
Odour	No information available.
Odour threshold	No information available

Property	**Values**	**Remarks • Method**
Melting point / freezing point	87 °C	None known
Initial boiling point and boiling range	No data available	None known
Flammability	No data available	None known
Flammability Limit in Air		None known
Upper flammability or explosive limits	No data available	
Lower flammability or explosive limits	No data available	
Flash point	No data available	None known
Autoignition temperature	No data available	None known
Decomposition temperature		None known
pH	No data available	None known
pH (as aqueous solution)	No data available	No information available
Kinematic viscosity	No data available	None known
Dynamic viscosity	No data available	None known
Water solubility	658 g/l	@ 20 °C
Solubility(ies)	No data available	None known
Partition coefficient	0.95	None known
Vapour pressure	1.96 Pa	@ 20°C
Relative density	1.953	@ 20 °C
Bulk density	No data available	
Liquid Density	No data available	
Relative vapour density	No data available	None known
Particle characteristics		
Particle Size	No information available	
Particle Size Distribution	No information available	

9.2. Other information

Molecular weight	428.17

Molecular formula $C_8H_5F_{13}O_3S$

9.2.1. Information with regards to physical hazard classes
Not applicable

9.2.2. Other safety characteristics
No information available

SECTION 10: Stability and reactivity

10.1. Reactivity

Reactivity No information available.

10.2. Chemical stability

Stability Stable under normal conditions.

Explosion data
Sensitivity to mechanical impact None.
Sensitivity to static discharge None.

10.3. Possibility of hazardous reactions

Possibility of hazardous reactions None under normal processing.

10.4. Conditions to avoid

Conditions to avoid Exposure to air or moisture over prolonged periods.

10.5. Incompatible materials

Incompatible materials Acids. Bases. Oxidising agent.

Hazardous decomposition products None known based on information supplied.

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Information on likely routes of exposure

Product Information

Inhalation Specific test data for the substance or mixture is not available. Corrosive by inhalation.

(based on components). Inhalation of corrosive fumes/gases may cause coughing, choking, headache, dizziness, and weakness for several hours. Pulmonary edema may occur with tightness in the chest, shortness of breath, bluish skin, decreased blood pressure, and increased heart rate. Inhaled corrosive substances can lead to a toxic edema of the lungs. Pulmonary edema can be fatal.

Eye contact Specific test data for the substance or mixture is not available. Causes serious eye damage. (based on components). Corrosive to the eyes and may cause severe damage including blindness. May cause irreversible damage to eyes.

Skin contact Specific test data for the substance or mixture is not available. Corrosive. (based on components). Causes burns.

Ingestion Specific test data for the substance or mixture is not available. Causes burns. (based on components). Ingestion causes burns of the upper digestive and respiratory tracts. May cause severe burning pain in the mouth and stomach with vomiting and diarrhea of dark blood. Blood pressure may decrease. Brownish or yellowish stains may be seen around the mouth. Swelling of the throat may cause shortness of breath and choking. May cause lung damage if swallowed. May be fatal if swallowed and enters airways. Harmful if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics

Symptoms Redness. Burning. May cause blindness. Coughing and/ or wheezing.

Numerical measures of toxicity

Acute toxicity

Component Information

Chemical name	Oral LD50	Dermal LD50	Inhalation LC50
1H,1H,2H,2H-Perfluorooctane sulfonic acid	> 300 - < 2000 mg/kg (Rat)	> 2000 mg/kg (Rat)	

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Skin corrosion/irritation Classification based on data available for ingredients. Causes severe skin burns and eye damage.

Serious eye damage/eye irritation Classification based on data available for ingredients. Causes serious eye damage. Causes burns.

Respiratory or skin sensitisation	No information available.
Germ cell mutagenicity	No information available.
Carcinogenicity	No information available.
Reproductive toxicity	No information available.
STOT - single exposure	No information available.
STOT - repeated exposure	May cause damage to organs through prolonged or repeated exposure.
Aspiration hazard	No information available.

11.2. Information on other hazards

11.2.1. Endocrine disrupting properties

Endocrine disrupting properties	No information available.

11.2.2. Other information

Other adverse effects	No information available.

SECTION 12: Ecological information

12.1. Toxicity

Ecotoxicity	The environmental impact of this product has not been fully investigated.

12.2. Persistence and degradability

Persistence and degradability	No information available.

12.3. Bioaccumulative potential

Bioaccumulation There is no data for this product.

Component Information

Chemical name	Partition coefficient
1H,1H,2H,2H-Perfluorooctane sulfonic acid	0.95

12.4. Mobility in soil

Mobility in soil No information available.

12.5. Results of PBT and vPvB assessment

PBT and vPvB assessment No information available.

Chemical name	PBT and vPvB assessment
1H,1H,2H,2H-Perfluorooctane sulfonic acid	The substance is not PBT / vPvB

12.6. Endocrine disrupting properties

Endocrine disrupting properties No information available.

12.7. Other adverse effects

No information available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste from residues/unused products Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation.

Contaminated packaging Do not reuse empty containers.

SECTION 14: Transport information

IATA

14.1 UN number or ID number UN3261
14.2 UN proper shipping name Corrosive solid, acidic, organic, n.o.s. (1H,1H,2H,2H-Perfluorooctane sulfonic acid)
14.3 Transport hazard class(es) 8

14.4 Packing group	II
Description	UN3261, Corrosive solid, acidic, organic, n.o.s. (1H,1H,2H,2H-Perfluorooctane sulfonic acid), 8, II
14.5 Environmental hazards	Not applicable
14.6 Special precautions for user	
Special Provisions	A3, A803
ERG Code	8L

IMDG

14.1 UN number or ID number	UN3261
14.2 UN proper shipping name	Corrosive solid, acidic, organic, n.o.s. (1H,1H,2H,2H-Perfluorooctane sulfonic acid)
14.3 Transport hazard class(es)	8
14.4 Packing group	II
Description	UN3261, Corrosive solid, acidic, organic, n.o.s. (1H,1H,2H,2H-Perfluorooctane sulfonic acid), 8, II
14.5 Marine pollutant	NP
14.6 Special precautions for user	
Special Provisions	274
EmS-No.	F-A, S-B No information available
14.7 Maritime transport in bulk according to IMO instruments	No information available

RID

14.1 UN number or ID number	UN3261
14.2 UN proper shipping name	Corrosive solid, acidic, organic, n.o.s. (1H,1H,2H,2H-Perfluorooctane sulfonic acid)
14.3 Transport hazard class(es)	8
14.4 Packing group	II
Description	UN3261, Corrosive solid, acidic, organic, n.o.s. (1H,1H,2H,2H-Perfluorooctane sulfonic acid), 8, II
14.5 Environmental hazards	Not applicable
14.6 Special precautions for user	
Special Provisions	274
Classification code	C4

ADR

14.1 UN number or ID number	UN3261
14.2 UN proper shipping name	Corrosive solid, acidic, organic, n.o.s. (1H,1H,2H,2H-Perfluorooctane sulfonic acid)
14.3 Transport hazard class(es)	8
14.4 Packing group	II
Description	UN3261, Corrosive solid, acidic, organic, n.o.s. (1H,1H,2H,2H-Perfluorooctane sulfonic acid), 8, II, (E)
14.5 Environmental hazards	Not applicable
14.6 Special precautions for user	
Special Provisions	274
Classification code	C4
Tunnel restriction code	(E)

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

National regulations

Germany

Water hazard class (WGK) slightly hazardous to water (WGK 1)

TA Luft (German Air Pollution Control Regulation)

Poland

SDS created according to the following Polish regulation: Act of February 25, 2011 on chemical substances and their mixtures (Journal of Laws of 2018, item 143, as amended). Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), establishing the European Chemicals Agency (EC) as amended. Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labeling and packaging of substances and mixtures, as amended. Regulation of the Minister of Health of 10 August 2012 on the criteria and method of classifying chemical substances and their mixtures (Journal of Laws of 2012, item 1018). Regulation of the Minister of Health of 20 April 2012 on labeling packaging of hazardous substances and mixtures and some mixtures (Journal of Laws of 2012, item 445). Regulation of the Minister of Family, Labor and Social Policy of 12 June 2018 on the maximum allowable concentrations and intensities of factors harmful to health in the work environment (Journal of Laws of 2018, item 1286). Announcement of the Minister of Economy, Labor and Social Policy of August 28, 2003 on the publication of the unified text of the Ordinance of the Minister of Labor and Social Policy on general health and safety at work regulations (Journal of Laws of 2003, No. 169, item 1650) . Regulation of the Minister of Health of 30 December 2004 on occupational safety and health related to the presence of chemical agents in the workplace (Journal of Laws of 2005, No. 11, item 86). Act of December 14, 2012 on waste (Journal of Laws of 2013, item 21) Regulation of the Minister of Health of December 30, 2004 on occupational health and safety related to the presence of chemical agents in the workplace (Journal U. of 2005, No. 11, item 86). Waste Act of December 14, 2012 (Journal of Laws of 2013, item 21). Act of 13 June 2013 on the management of packaging and packaging waste, Journal of Laws 2013, item 888). Government statement of September 24, 2002 - European Agreement on the International Carriage of Dangerous Goods by Road (ADR) (Journal of Laws No. 194, item 1629 and Journal of Laws of 2003, No. 207, item 2013 and 2014).

European Union

Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.

Authorisations and/or restrictions on use:
This product does not contain substances subject to authorisation (Regulation (EC) No. 1907/2006 (REACH), Annex XIV) This product does not contain substances subject to restriction (Regulation (EC) No. 1907/2006 (REACH), Annex XVII)

DIRECTIVE (EU) 2021/1187 on the marketing and use of explosives precursors
Not applicable

Persistent Organic Pollutants
Not applicable

Ozone-depleting substances (ODS) regulation (EC) 1005/2009
Not applicable

International Inventories

TSCA	Complies
DSL/NDSL	Contact supplier for inventory compliance status
EINECS/ELINCS	Contact supplier for inventory compliance status
ENCS	Contact supplier for inventory compliance status
IECSC	Contact supplier for inventory compliance status
KECL	Contact supplier for inventory compliance status
PICCS	Contact supplier for inventory compliance status
AIIC	Contact supplier for inventory compliance status

Legend:
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

15.2. Chemical safety assessment

Chemical Safety Report A Chemical Safety Assessment is not required for this substance

SECTION 16: Other information

Key or legend to abbreviations and acronyms used in the safety data sheet

Full text of H-Statements referred to under section 3
H302 - Harmful if swallowed
H314 - Causes severe skin burns and eye damage
H318 - Causes serious eye damage
H373 - May cause damage to organs through prolonged or repeated exposure

Legend
SVHC: Substances of Very High Concern for Authorisation:

Legend Section 8: Exposure controls/personal protection

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
Ceiling	Maximum limit value	Sk*	Skin designation

Classification procedure	
Classification according to Regulation (EC) No. 1272/2008 [CLP]	Method Used
Acute oral toxicity	Calculation method
Acute dermal toxicity	Calculation method
Acute inhalation toxicity - gas	Calculation method
Acute inhalation toxicity - Vapour	Calculation method
Acute inhalation toxicity - dust/mist	Calculation method
Skin corrosion/irritation	Calculation method
Serious eye damage/eye irritation	Calculation method
Respiratory sensitisation	Calculation method
Skin sensitisation	Calculation method
Mutagenicity	Calculation method
Carcinogenicity	Calculation method
Reproductive toxicity	Calculation method
STOT - single exposure	Calculation method
STOT - repeated exposure	Calculation method
Acute aquatic toxicity	Calculation method
Chronic aquatic toxicity	Calculation method
Aspiration hazard	Calculation method
Ozone	Calculation method

Key literature references and sources for data used to compile the SDS
Agency for Toxic Substances and Disease Registry (ATSDR)
U.S. Environmental Protection Agency ChemView Database
European Food Safety Authority (EFSA)

EPA (Environmental Protection Agency)
Acute Exposure Guideline Level(s) (AEGL(s))
U.S. Environmental Protection Agency Federal Insecticide, Fungicide, and Rodenticide Act
U.S. Environmental Protection Agency High Production Volume Chemicals
Food Research Journal
Hazardous Substance Database
International Uniform Chemical Information Database (IUCLID)
Japan GHS Classification
Australian National Industrial Chemicals Notification and Assessment Scheme (NICNAS)
NIOSH (National Institute for Occupational Safety and Health)
National Library of Medicine's ChemID Plus (NLM CIP)
National Library of Medicine's PubMed database (NLM PUBMED)
National Toxicology Program (NTP)
New Zealand's Chemical Classification and Information Database (CCID)
Organisation for Economic Co-operation and Development Environment, Health, and Safety Publications
Organisation for Economic Co-operation and Development High Production Volume Chemicals Programme
Organisation for Economic Co-operation and Development Screening Information Data Set
World Health Organization

Revision date 02-Jan-2024

This material safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006
Disclaimer
The information in this safety data sheet (SDS) has been prepared with due care and is true and accurate to the best of our knowledge. The user must determine the suitability of the information for its particular purpose, ensure compliance with existing laws and regulations, and be aware that other or additional safety or performance considerations may arise when using, handling and/ or storing the material. The information in this SDS does not purport to be all inclusive or a guarantee as to the properties of the material supplied, and should be used only as a guide. LGC makes no warranties or representations as to the accuracy and completeness of the information contained herein, shall not be held responsible for the suitability of this information for the user's intended purposes or the consequences of such use, and shall not be liable for any damage or loss, howsoever arising, direct or otherwise.

End of Safety Data Sheet

AccuStandard, Inc.
125 Market St., New Haven, CT 06513 USA
Tel: 203-786-5290 Fax: 203-786-5287

SAFETY DATA SHEET

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

1.1 - Product Identifiers

Catalog Name: PFOA-014S

Description: 1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS) in Methanol

1.2 - Relevant Identified Uses of the Substance or Mixture

Laboratory Chemical Reference Material

1.3 - Supplier Details

Company: AccuStandard, Inc.
125 Market St.
New Haven, CT 06513 USA

Telephone Number: 203-786-5290

Fax: 203-786-5287

Email: edocs@accustandard.com

1.4 - Emergency Telephone Number

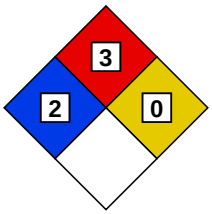
Emergency Phone #: AccuStandard, Inc.
1-203-502-7070 (USA)
+001-203-502-7070 (International)

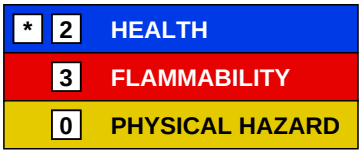
24 hours / 7 days a week

SECTION 2 - HAZARDS IDENTIFICATION

2.1 - GHS Label Elements







Signal Word: Danger

Hazard Codes:

H225 - Highly Flammable (Flammable liquids, category 2)

H301 - Toxic if swallowed. (Acute toxicity, oral, category 3)

H311 - Toxic if absorbed through skin. (Acute toxicity, dermal, category 3)

H315 - Irritating to skin. (Skin corrosion/irritation, category 2)

H320 - Irritating to eyes. (Eye damage/irritation, category 2B)

H332 - Harmful if inhaled. (Acute toxicity, inhalation, category 4)

H336 - Overexposure may cause dizziness, nausea, muscle weakness, narcosis and respiratory failure.

H360 - California Proposition 65 Warning: This product contains a component (or components) that may cause birth defects or other reproductive harm in a quantity greater than or equal to 0.1%.

H370 - Causes damage to organs. (Specific target organ toxicity, single exposure, category 1)

Precautionary Codes:

SECTION 2 - HAZARDS IDENTIFICATION *- continued*

2.1 - GHS Label Elements *- continued*

P202 - This product should only by used by persons trained in the safe handling of hazardous chemicals.

P233 - Store in a tightly closed container. (P404)

P262 - Do not get in eyes, on skin or clothing.

P264 - Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available.

P280 - Protective gloves must be worn to prevent skin contact.

P284 - Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), or a risk assessment shows air-purifying respirators are appropriate, use of a NIOSH/MSHA approved air supplied respirator is advised. Use a full-face respirator with multi-purpose combination (US) or type ABEK (EN14387) respirator cartridges in absence of proper environmental control. Always use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Engineering and/or administrative controls should be implemented to reduce exposure.

P331 - Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person.

P338 - Eye contact: Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers.

P360 - Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.

2.2 - Other Hazards

2.2.1 - Symptom of Exposure Health/Environment

Highly Flammable (Flammable liquids, category 2)

Causes damage to organs. (Specific target organ toxicity, single exposure, category 1)

After ingestion or inhalation, initial symptoms may be only that of mild intoxication, but may become severe after 12 or 18 hours.

POISON: May be fatal or cause blindness if swallowed.

Overexposure may cause dizziness, nausea, muscle weakness, narcosis and respiratory failure.

2.2.2 - Potential Health Effects

Irritating to eyes. (Eye damage/irritation, category 2B)

Irritating to skin. (Skin corrosion/irritation, category 2)

Toxic if absorbed through skin. (Acute toxicity, dermal, category 3)

Irritating to mucous membrane and upper respiratory system.

Harmful if inhaled. (Acute toxicity, inhalation, category 4)

Toxic if swallowed. (Acute toxicity, oral, category 3)

2.2.3 - Routes of Entry

Inhalation, ingestion or skin contact.

2.2.4 - Carcinogenicity

California Proposition 65 Warning: This product contains a component (or components) that may cause birth defects or other reproductive harm in a quantity greater than or equal to 0.1%.

SECTION 3 - COMPOSITION / ANALYTES DATA

Description: 1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS) in Methanol

SECTION 3 - COMPOSITION / ANALYTES DATA *- continued*

Analyte	CAS #	% Concentration	ACGIH -TLV (mg/m³)			OSHA -PEL (mg/m³)		
			TWA	STEL	Skin	TWA	STEL	Skin
1H,1H,2H,2H-Perfluorodecanesulfonic acid	39108-34-4	0.010						
Methanol	67-56-1	99.990				260		

SECTION 4 - FIRST AID MEASURES

4.1 - First Aid Procedures - General

Get medical assistance for all cases of overexposure.

4.2 - Eye Contact

Eye contact: Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. (P338)

4.3 - Skin Contact

Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse. (P360)

4.4 - Inhalation

Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek immediate medical attention.

4.5 - Ingestion

Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person. (P331)

SECTION 5 - FIRE FIGHTING MEASURES

5.1 - Flammable Properties

Dangerous fire and explosive hazard.

Containers can build up pressure if exposed to heat.

Vapors can travel to a source of ignition and flash back.

During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

5.2 - Extinguishing Media

Use alcohol foam, carbon dioxide, dry chemical, or water spray when fighting fires involving this material.

5.3 - Protection of Firefighters

As in any fire, wear self-contained breathing apparatus pressure demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

6.1 - Spill Response

Wear suitable protective equipment listed under Exposure Controls / Personal Protection. Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards. Contain the release and eliminate its source, if this can be done without risk. Dispose as hazardous waste. Comply with Federal, State and local regulations.

SECTION 7 - HANDLING AND STORAGE

Store in a tightly closed container. (P404)

Store in a cool place below 14 °F (-10 °C).

Avoid breathing vapors or mists.

Use with adequate ventilation.

Do not get in eyes, on skin or clothing. (P262)

Avoid prolonged or repeated exposure.

This product should only by used by persons trained in the safe handling of hazardous chemicals. (P202)

SECTION 8 - EXPOSURE CONTROLS

8.1 - Engineering Controls/PPE

Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available. (P264)

8.2 - General Hygene Considerations

Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), or a risk assessment shows air-purifying respirators are appropriate, use of a NIOSH/MSHA approved air supplied respirator is advised. Use a full-face respirator with multi-purpose combination (US) or type ABEK (EN14387) respirator cartridges in absence of proper environmental control. Always use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Engineering and/or administrative controls should be implemented to reduce exposure.

Material should be handled or transferred in an approved fume hood or with adequate ventilation.

Protective gloves must be worn to prevent skin contact. (P280)

(Chloroprene, natural rubber, nitrile, or equivalent)

Use eye protection tested and approved under the appropriate government standards such as NIOSH (US) or EN 166 (EU).

All recommendations are advisory only and must be evaluated by an industrial hygienist and/or safety officer familiar with the specific situation of anticipated use, such as concentration and amount of the substance in the workplace. Any recommendation should not be construed as offering an approval for any specific use of the product.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear liquid

Odor: N/A

Odor Threshold: N/A

pH: N/A

Melting Point: -93.9 °C

Boiling Point: 65 °C

Flash Point: 52 °F (11 °C) (tcc)

Evaporation Rate (Butyl Acetate=1): 5.9

Flammability Class: N/A

Lower Flammability Level: 6.7

Upper Flammability Level: 36.5

Vapor Pressure: 97 mmHg (20 °C)

Vapor Density (Air = 1): 1.1 g/L

Specific Gravity: 0.791 g/cm3

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES *- continued*

Solubility in Water: Very soluble

Partition Coefficient: log Pow: -0.77

Autoignition Temperature: 385 °C

Decomposition Temperature: N/A

Viscosity: N/A

VOC Content: N/A

Percent Volatile: 99.9+

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable

Materials to Avoid: Acids
Oxidizers

Hazardous Decomposition: Oxides of carbon; Formaldehyde

Hazardous Polymerization: Will not occur

Condition to Avoid: Heat; Contact with ignition sources

SECTION 11 - TOXICOLOGICAL INFORMATION

Human Health Toxicity

See section 2 for specific toxicological information for the ingredients of this product.

LD50 (Oral): Human - 143 mg/kg; Rat - 1500 mg/kg

LD50 (Dermal) : Rabbit - >2000 mg/kg

LC50 (Inhalation): Rat - >20 mg/L

WARNING: This product contains chemicals known to the state of California to cause birth defects or other reproductive harm.

No other information related to the toxicological properties of this product is available at this time.

SECTION 12 - ECOLOGICAL INFORMATION

Environmental Toxicity

By complying with sections 6 and 7 there should be no release to the environment.

LC50 (Fish): >1000 mg/L 96H

EC50 (Aquatic Invertebrate): >1000 mg/L 48H

BCF: 1.0

Hydrolyzes readily on contact with water. Readily biodegradable.

No other information related to the ecological properties of this product is available at this time.

SECTION 13 - DISPOSAL CONSIDERATIONS

Recycle or incinerate at any EPA approved facility or dispose in compliance with Federal, State and local regulations. Empty containers must be triple-rinsed prior to disposal.

SECTION 14 - TRANSPORT INFORMATION

Transportation Information (DOT/IATA)

SECTION 14 - TRANSPORT INFORMATION *- continued*

UN Number: UN1230

Class: 3

Packing Group: II

Proper Shipping Name: Methanol

Poison by Inhalation: No

Marine Pollutant: No

SECTION 15 - REGULATORY INFORMATION

WARNING: This product contains chemicals known to the state of California to cause birth defects or other reproductive harm.

This product is subject to SARA section 313 reporting requirements.

Not all components are listed on the TSCA Inventory.

For laboratory, research and development use only. Not for manufacturing or commercial purposes.

In addition to federal and state regulations, local regulations may apply. Check with your local regulatory authorities.

SECTION 16 - OTHER INFORMATION

This document has been designed to meet the requirements of OSHA, ANSI, GHS and CHIPs regulations. Chemicals are classified using the Globally Harmonized System for Classification and Labeling of Chemicals and CLP Regulation (EC) No. 1272/2008.

The statements contained herein are offered for informational purposes only and are based on technical data that we believe to be accurate. The manufacturer will not assume any liability for the accuracy and completeness of this information. Final determination of the suitability of the material is the responsibility of the user. Although certain hazards are described herein, the user should not presume that these are the only hazards that exist. Since conditions and manner of use are outside of the manufacturers control, we make

NO WARRANTY OF MERCHANTABILITY, EXPRESSED OR IMPLIED, AND ASSUME NO LIABILITY RESULTING FROM ITS USE.

Legend : N/A = Not Available ND = Not Determined NR = Not Regulated

Alteration of any information contained herein without written permission from the manufacturer is strictly prohibited.

HMIS/NFPA HAZARD INDEX

0 - Minimal
1 - Slight
2 - Moderate
3 - Serious
4 - Severe

* - Additional Hazard

GHS HAZARD INDEX

Category 1 - Most Severe
Category 5 - Least Severe

**** End of Document ****

N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED (MIX OF ISOMERS) 50 UG/ML IN METHANOL

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830 and according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 16/10/2018 Revision date: : Version: 1.0

ULM-10656-S

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form : Mixtures

Product name : N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED (MIX OF ISOMERS) 50 UG/ML IN METHANOL

Product code : ULM-10656-S

1.2. Relevant identified uses of the substance or mixture and uses advised against

1.2.1. Relevant identified uses

Main use category : Professional use

Industrial/Professional use spec : For professional use only

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

Cambridge Isotope Laboratories, Inc.
50 Frontage Road
Andover, MA 01810
USA

USA: 1-800-322-1174 Int: 1-978-749-8000
cilsales@isotope.com www.isotope.com

Emergency telephone number

Emergency numbers:

Chemtrec: 1-800-424-9300 (24 hours)
International: 1-703-741-5970 (24 hours)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Flam. Liq. 2	H225
Acute Tox. 3 (Oral)	H301
Acute Tox. 3 (Dermal)	H311
Acute Tox. 3 (Inhalation:vapour)	H331
Skin Irrit. 2	H315
Eye Irrit. 2A	H319
STOT SE 1	H370

Full text of hazard classes and H-statements : see section 16

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]

F; R11
T; R39/23/24/25
Xi; R36/38

Full text of R-phrases: see section 16

GHS-US classification

Flam. Liq. 2	H225
Acute Tox. 3 (Oral)	H301
Acute Tox. 3 (Dermal)	H311
Acute Tox. 3 (Inhalation:vapour)	H331
Skin Irrit. 2	H315
Eye Irrit. 2A	H319
STOT SE 1	H370

Full text of H statements : see section 16

Adverse physicochemical, human health and environmental effects

Eyes, Kidney, Liver, Heart, Central nervous system. Highly flammable liquid and vapour. Causes damage to organs (eyes, kidneys, liver, heart, central nervous system) (if inhaled, if swallowed, in contact with skin). Toxic in contact with skin. Toxic if inhaled. Toxic if swallowed. Causes skin irritation. Causes serious eye irritation.

2.2. Label elements

Labeling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP) :



GHS02 GHS08 GHS06

Signal word (CLP) : Danger

Hazard statements (CLP) : H225 - Highly flammable liquid and vapour
H301+H311+H331 - Toxic if swallowed, in contact with skin or if inhaled
H315 - Causes skin irritation
H319 - Causes serious eye irritation
H370 - Causes damage to organs (eyes, heart, kidneys, liver, central nervous system) (in contact with skin, if inhaled, if swallowed)

Precautionary statements (CLP) : P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233 - Keep container tightly closed.
P240 - Ground/bond container and receiving equipment.
P241 - Use explosion-proof electrical, lighting, ventilating equipment
P260 - Do not breathe dust, mist, vapors, fume, gas, spray.
P264 - Wash hands, forearms and face thoroughly after handling.
P270 - Do not eat, drink or smoke when using this product.
P271 - Use only outdoors or in a well-ventilated area.

GHS-US labeling

Hazard pictograms (GHS-US) :



GHS02 GHS08 GHS06

Signal word (GHS-US) : Danger

Hazard statements (GHS-US) : H225 - Highly flammable liquid and vapour
H301+H311+H331 - Toxic if swallowed, in contact with skin or if inhaled
H315 - Causes skin irritation
H319 - Causes serious eye irritation
H370 - Causes damage to organs (eyes, kidneys, liver, heart, central nervous system) (Dermal, Inhalation, oral)

Precautionary statements (GHS-US) : P210 - Keep away from heat, open flames, sparks. - No smoking.
P233 - Keep container tightly closed.
P240 - Ground/Bond container and receiving equipment
P241 - Use explosion-proof electrical, lighting, ventilating equipment
P242 - Use only non-sparking tools.
P243 - Take precautionary measures against static discharge.
P260 - Do not breathe dust, fume, mist, gas, spray, vapors.
P261 - Avoid breathing dust, fume, gas, spray, vapors, mist.
P264 - Wash hands, forearms and face thoroughly after handling.
P270 - Do not eat, drink or smoke when using this product.
P271 - Use only outdoors or in a well-ventilated area.
P280 - Wear protective clothing, protective gloves.
P301+P310 - If swallowed: Immediately call a doctor, a POISON CENTER
P302+P352 - If on skin: Wash with plenty of water
P303+P361+P353 - If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P307+P311 - If exposed: Call a poison center/doctor
P311 - Call a doctor, a POISON CENTER

P312 - Call a doctor, a POISON CENTER if you feel unwell
P321 - Specific treatment (see Hazardous component(s) for labeling on this label)
P322 - Specific treatment (see Hazard pictograms (CLP) on this label)
P330 - Rinse mouth.
P332+P313 - If skin irritation occurs: Get medical advice/attention.
P337+P313 - If eye irritation persists: Get medical advice/attention.
P361+P364 - Take off immediately all contaminated clothing and wash it before reuse.
P362+P364 - Take off contaminated clothing and wash it before reuse.
P370+P378 - In case of fire: Use alcohol resistant foam, carbon dioxide (CO2), dry extinguishing powder to extinguish.
P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
P403+P235 - Store in a well-ventilated place. Keep cool.
P405 - Store locked up.
P501 - Dispose of contents/container to hazardous or special waste collection point, in accordance with local, regional, national and/or international regulation

2.3. Other hazards

PBT: not relevant – no registration required

SECTION 3: Composition/Information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Name	Product identifier	%	Classification according to Directive 67/548/EEC
100% METHANOL UNLABELED	(CAS-No.) 67-56-1 (EC-No.) 200-659-6 (EC Index-No.) 603-001-00-X (REACH-no) 01-2119433307-44	99.9937	F; R11 T; R39/23/24/25 Xi; R36/38
N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED -	(CAS-No.) 2355-31-9 (EC Index-No.)	0.0063	Xi; R36/37/38

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
100% METHANOL UNLABELED	(CAS-No.) 67-56-1 (EC-No.) 200-659-6 (EC Index-No.) 603-001-00-X (REACH-no) 01-2119433307-44	99.9937	Flam. Liq. 2, H225 Acute Tox. 3 (Oral), H301 Acute Tox. 3 (Dermal), H311 Acute Tox. 3 (Inhalation:vapour), H331 Skin Irrit. 2, H315 Eye Irrit. 2, H319 STOT SE 1, H370
N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED -	(CAS-No.) 2355-31-9 (EC Index-No.)	0.0063	Skin Irrit. 2, H315 Eye Irrit. 2, H319 STOT SE 3, H335

Name	Product identifier	%	GHS-US classification
100% METHANOL UNLABELED	(CAS-No.) 67-56-1	99.9937	Flam. Liq. 2, H225 Acute Tox. 3 (Oral), H301 Acute Tox. 3 (Dermal), H311 Acute Tox. 3 (Inhalation:vapour), H331 Skin Irrit. 2, H315 Eye Irrit. 2A, H319 STOT SE 1, H370
N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED -	(CAS-No.) 2355-31-9	0.0063	Skin Irrit. 2, H315 Eye Irrit. 2A, H319 STOT SE 3, H335

Full text of R- and H- phrases: see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : If medical advice is needed, have product container or label at hand. Call a physician immediately. Evacuate danger area.

First-aid measures after inhalation : Remove person to fresh air and keep comfortable for breathing. If not breathing, give artificial respiration. Call a doctor.

First-aid measures after skin contact : Rinse skin with water/shower. Take immediately victim to hospital. Remove/Take off immediately all contaminated clothing. If skin irritation occurs: Get medical advice/attention.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

First-aid measures after ingestion : Do not induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth. Call a physician immediately.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/effects after inhalation : Toxic if inhaled.

Symptoms/effects after skin contact : Toxic in contact with skin. Causes skin irritation.

Symptoms/effects after eye contact : Causes serious eye irritation.

Symptoms/effects after ingestion : Toxic if swallowed.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Dry powder. Dry sand.

Unsuitable extinguishing media : Do not use a heavy water stream.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Highly flammable liquid and vapour.

Reactivity : vapors may form flammable mixture with air. Highly flammable liquid and vapour.

5.3. Advice for firefighters

Firefighting instructions : Do not enter fire area without proper protective equipment, including respiratory protection.

Protection during firefighting : Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing. Wear recommended personal protective equipment.

Other information : Use water spray to cool exposed surfaces.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Emergency procedures : Wear respiratory protection. Do not breathe dust, mist, gas, spray, vapors, fume. Avoid contact with skin, eyes and clothing. Ventilate spillage area. Remove all sources of ignition. No open flames, no sparks, and no smoking. Ensure adequate air ventilation. Special attention should be given to low areas/pits where flammable vapors can accumulate.

6.1.2. For emergency responders

Protective equipment : Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

6.2. Environmental precautions

Prevent entry to sewers and public waters. Do not allow to enter drains or water courses. Avoid release to the environment.

6.3. Methods and material for containment and cleaning up

For containment : Dike and contain spill.

Methods for cleaning up : Take up liquid spill into absorbent material. Notify authorities if product enters sewers or public waters. This material and its container must be disposed of in a safe way, and as per local legislation.

Other information : Dispose of materials or solid residues at an authorized site.

6.4. Reference to other sections

For further information refer to section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Ground/bond container and receiving equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Flammable vapors may accumulate in the container. Use explosion-proof equipment. Wear personal protective equipment. Do not breathe dust, fume, gas, spray, vapors, mist. Do not get in eyes, on skin, or on clothing. Use only outdoors or in a well-ventilated area.

Hygiene measures : Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Ground/bond container and receiving equipment. Store in a well-ventilated place. Keep container tightly closed. Store locked up.

Storage conditions : Store at room temperature away from light and moisture.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED (MIX OF ISOMERS) 50 UG/ML IN METHANOL		
Italy - Portugal - USA ACGIH	ACGIH TWA (ppm)	200.00000000 ppm Basis: USA. ACGIH Threshold Limit Values (TLV)
Italy - Portugal - USA ACGIH	ACGIH STEL (ppm)	250 ppm Basis: USA. ACGIH Threshold Limit Values (TLV)
Italy - Portugal - USA ACGIH	Remark (ACGIH)	Headache. Nausea. Dizziness. Eye damage. Substances for which there is a Biological Exposure Index or Indices (see BEI section). Danger of cutaneous absorption.
USA NIOSH	NIOSH REL (TWA) (mg/m³)	260 mg/m³ Basis: NIOSH Recommended Exposure Limits
USA NIOSH	NIOSH REL (TWA) (ppm)	200 ppm Basis: NIOSH Recommended Exposure Limits
USA NIOSH	NIOSH REL (STEL) (mg/m³)	325 mg/m³ Basis: NIOSH Recommended Exposure Limits
USA NIOSH	NIOSH REL (STEL) (ppm)	250 ppm Basis: NIOSH Recommended Exposure Limits
USA NIOSH	Remark (NIOSH)	Potential for dermal absorption.
USA OSHA	OSHA PEL (TWA) (mg/m³)	260 mg/m³ Basis: USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants - 1910.1000. California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	OSHA PEL (TWA) (ppm)	200 ppm Basis: USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants - 1910.1000. California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	OSHA PEL (STEL) (mg/m³)	325 mg/m³ Basis: USA. OSHA - Table Z-1 Limits for Air Contaminants - 1910.1000. California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	OSHA PEL (STEL) (ppm)	250 ppm Basis: USA. OSHA - Table Z-1 Limits for Air Contaminants - 1910.1000. California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	OSHA PEL (Ceiling) (ppm)	1000 ppm California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	Remark (OSHA)	The value in mg/m3 is approximate. Skin notation.

100% METHANOL UNLABELED (67-56-1)		
Italy - Portugal - USA ACGIH	ACGIH TWA (ppm)	200.00000000 ppm Basis: USA. ACGIH Threshold Limit Values (TLV)
Italy - Portugal - USA ACGIH	ACGIH STEL (ppm)	250 ppm Basis: USA. ACGIH Threshold Limit Values (TLV)
Italy - Portugal - USA ACGIH	Remark (ACGIH)	Headache. Nausea. Dizziness. Eye damage. Substances for which there is a Biological Exposure Index or Indices (see BEI section). Danger of cutaneous absorption.
USA NIOSH	NIOSH REL (TWA) (mg/m³)	260 mg/m³ Basis: NIOSH Recommended Exposure Limits
USA NIOSH	NIOSH REL (TWA) (ppm)	200 ppm Basis: NIOSH Recommended Exposure Limits

100% METHANOL UNLABELED (67-56-1)		
USA NIOSH	NIOSH REL (STEL) (mg/m³)	325 mg/m³ Basis: NIOSH Recommended Exposure Limits
USA NIOSH	NIOSH REL (STEL) (ppm)	250 ppm Basis: NIOSH Recommended Exposure Limits
USA NIOSH	Remark (NIOSH)	Potential for dermal absorption.
USA OSHA	OSHA PEL (TWA) (mg/m³)	260 mg/m³ Basis: USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants - 1910.1000. California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	OSHA PEL (TWA) (ppm)	200 ppm Basis: USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants - 1910.1000. California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	OSHA PEL (STEL) (mg/m³)	325 mg/m³ Basis: USA. OSHA - Table Z-1 Limits for Air Contaminants - 1910.1000. California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	OSHA PEL (STEL) (ppm)	250 ppm Basis: USA. OSHA - Table Z-1 Limits for Air Contaminants - 1910.1000. California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	OSHA PEL (Ceiling) (ppm)	1000 ppm California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	Remark (OSHA)	The value in mg/m3 is approximate. Skin notation.

N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED (MIX OF ISOMERS) 50 UG/ML IN METHANOL	
DNEL/DMEL (Workers)	
Acute - systemic effects, dermal	40 mg/kg bodyweight/day
Acute - systemic effects, inhalation	260 mg/m³
Acute - local effects, dermal	260 mg/cm²
Long-term - systemic effects, dermal	40 mg/kg bodyweight/day
Long-term - local effects, dermal	260 mg/cm²
Long-term - local effects, inhalation	260 mg/m³
DNEL/DMEL (General population)	
Acute - systemic effects, dermal	8 mg/kg body weight
Acute - systemic effects, inhalation	50 mg/m³
Acute - systemic effects, oral	8 mg/kg body weight
Acute - local effects, inhalation	50 mg/m³
Long-term - systemic effects,oral	8 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	50 mg/m³
Long-term - systemic effects, dermal	8 mg/kg bodyweight/day
Long-term - local effects, inhalation	50 mg/m³
PNEC (Water)	
PNEC aqua (freshwater)	154 mg/l
PNEC aqua (marine water)	15.4 mg/l
PNEC (Sediment)	
PNEC sediment (freshwater)	570.4 mg/kg dwt
PNEC (Soil)	
PNEC soil	23.5 mg/kg dwt
PNEC (STP)	
PNEC sewage treatment plant	100 mg/kg

8.2. Exposure controls

Appropriate engineering controls : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.

Personal protective equipment	:	Gloves. Protective clothing. Protective goggles. Self-contained breathing apparatus.



Materials for protective clothing	:	Wear suitable protective clothing and gloves.
Hand protection	:	Wear suitable protective clothing and gloves.
Eye protection	:	Wear eye protection. Chemical goggles or face shield with safety glasses.
Skin and body protection	:	Wear suitable protective clothing, gloves and eye/face protection.
Respiratory protection	:	In case of inadequate ventilation wear respiratory protection. Approved supplied air respirator.
Environmental exposure controls	:	Avoid release to the environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

The properties listed below are for the solvent, the main component of this mixture.

Physical state	:	Liquid
Appearance	:	Liquid
Molecular mass	:	32.04 g/mol
Color	:	Colorless
Odor	:	Pungent
Odor threshold	:	No data available
pH	:	No data available
Relative evaporation rate (butyl acetate=1)	:	No data available
Melting point	:	-98 °C (-144 °F)
Freezing point	:	No data available
Boiling point	:	64.7 °C (148.5 °F)
Flash point	:	9.7 °C (49.5 °F) - closed cup
Auto-ignition temperature	:	455 °C (851 °F) at 1,013 hPa (760 mmHg)
Decomposition temperature	:	No data available
Flammability (solid, gas)	:	No data available
Vapor pressure	:	130.3 hPa (97.7 mmHg) at 20 °C (68 °F); 169.27 hPa (126.96 mmHg) at 25 °C (77 °F)
Vapor pressure at 50 °C	:	546.6 hPa (410 mmHg) at 50 °C (122 °F)
Relative vapor density at 20 °C	:	1.11
Relative density	:	No data available
Specific gravity / density	:	0.791 g/ml at 25 °C (77 °F)
Solubility	:	Water: Completely miscible
Log Pow	:	-0.77
Log Kow	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available
Explosive properties	:	Product is not explosive.
Oxidizing properties	:	Non oxidizing material according to EC criteria.
Explosion limits	:	6 - 36 % (V)

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

vapors may form flammable mixture with air. Highly flammable liquid and vapour.

10.2. Chemical stability

See storage and expiration date on CoA.

10.3. Possibility of hazardous reactions

No dangerous reactions known under normal conditions of use.

10.4. Conditions to avoid

Avoid contact with hot surfaces. Heat. No flames, no sparks. Eliminate all sources of ignition.

10.5. Incompatible materials

Acid anhydrides. Acid chlorides. Oxidizing agent. Alkali Metal Amides. Reducing agents. Acids.

10.6. Hazardous decomposition products

Carbon oxides (CO, CO2).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Oral: Toxic if swallowed. Dermal: Toxic in contact with skin. Inhalation:vapour: Toxic if inhaled.

N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED (MIX OF ISOMERS) 50 UG/ML IN METHANOL	
LD50 oral rat	1187 - 2769 mg/kg
LD50 dermal rabbit	17100 mg/kg
LC50 inhalation rat (mg/l)	128.2 mg/l/4h ; 87.6 mg/l - 6 h
ATE CLP (oral)	100.000 mg/kg body weight
ATE CLP (dermal)	300.000 mg/kg body weight
ATE CLP (vapors)	3.000 mg/l/4h
ATE CLP (dust, mist)	128.200 mg/l/4h
LDLO, oral, human	143 mg/kg Remarks: Lungs, Thorax, or Respiration: Dyspnea. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

100% METHANOL UNLABELED (67-56-1)	
LD50 oral rat	1187 - 2769 mg/kg
LD50 dermal rabbit	17100 mg/kg
LC50 inhalation rat (mg/l)	128.2 mg/l/4h ; 87.6 mg/l - 6 h
ATE CLP (oral)	100.000 mg/kg body weight
ATE CLP (dermal)	300.000 mg/kg body weight
ATE CLP (vapors)	3.000 mg/l/4h
ATE CLP (dust, mist)	128.200 mg/l/4h
LDLO, oral, human	143 mg/kg Remarks: Lungs, Thorax, or Respiration: Dyspnea. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Skin corrosion/irritation : Skin. rabbit. Result: No skin irritation

Serious eye damage/irritation : Eyes. rabbit. Result: No eye irritation

Respiratory or skin sensitization : Maximisation Test . Guinea pig. Did not cause sensitization. (OECD 406 method)

Germ cell mutagenicity : AMES test : S. tymphimurium. Result: negative. fibroblast. Result: Negative. Mutation in mammalian somatic cells. Mutagenicity (in vivo mammalian bone-marrow cytogenetic test, chromosomal analysis) - Mouse - male and female Result: negative. Mouse - male and female. Result: Negative

Carcinogenicity : Not classified

Reproductive toxicity : Damage to fetus not classifiable. Fertility classification not possible from current data.

Specific target organ toxicity – single exposure : Causes damage to organs through prolonged or repeated exposure

Causes damage to organs

Specific target organ toxicity – repeated exposure : The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

No data available

Aspiration hazard : No aspiration toxicity classification.

Potential Adverse human health effects and symptoms : This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product. Effects due to Ingestion may include: Headache. Dizziness. Drowsiness. metabolic acidosis. Coma. May be fatal if swallowed and enters airways. If swallowed there is a risk of blindness. Effects on humans. stomach.

Symptoms/effects after inhalation : Toxic if inhaled.

Symptoms/effects after skin contact : Toxic in contact with skin. Causes skin irritation.

Symptoms/effects after eye contact : Causes serious eye irritation.

Symptoms/effects after ingestion : Toxic if swallowed.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : The product is not considered harmful to aquatic organisms or to cause long-term adverse effects in the environment.

N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED (MIX OF ISOMERS) 50 UG/ML IN METHANOL	
LC50 fish 1	15400 mg/l mortality LC50 - Lepomis machrochirus (Bluegill) - 96 h
EC50 Daphnia 1	> 10000 mg/l Daphnia magna (Water flea) - 48 h
EC50 Daphnia 2	22000 mg/l Growth inhibition EC50 - Scenedesmus capricornutum (fresh water algae) - 96 h
NOEC (acute)	7900 mg/l Oryzias latipes - 200 h

100% METHANOL UNLABELED (67-56-1)	
LC50 fish 1	15400 mg/l mortality LC50 - Lepomis machrochirus (Bluegill) - 96 h
EC50 Daphnia 1	> 10000 mg/l Daphnia magna (Water flea) - 48 h
EC50 Daphnia 2	22000 mg/l Growth inhibition EC50 - Scenedesmus capricornutum (fresh water algae) - 96 h
NOEC (acute)	7900 mg/l Oryzias latipes - 200 h

12.2. Persistence and degradability

N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED (MIX OF ISOMERS) 50 UG/ML IN METHANOL	
Biochemical oxygen demand (BOD)	600 - 1200 mg/g
Chemical oxygen demand (COD)	1420 mg/g
ThOD	1500 mg/g
Biodegradation	72 % - rapidly biodegradable aerobic - Exposure time 5 d

100% METHANOL UNLABELED (67-56-1)	
Biochemical oxygen demand (BOD)	600 - 1200 mg/g
Chemical oxygen demand (COD)	1420 mg/g
ThOD	1500 mg/g
Biodegradation	72 % - rapidly biodegradable aerobic - Exposure time 5 d

12.3. Bioaccumulative potential

N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED (MIX OF ISOMERS) 50 UG/ML IN METHANOL	
BCF fish 1	5 mg/l Cyprinus carpio (Carp) - 72 d at 20 °C
Bioconcentration factor (BCF REACH)	1
Log Pow	-0.77

100% METHANOL UNLABELED (67-56-1)	
BCF fish 1	5 mg/l Cyprinus carpio (Carp) - 72 d at 20 °C
Bioconcentration factor (BCF REACH)	1
Log Pow	-0.77

12.4. Mobility in soil

N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED (MIX OF ISOMERS) 50 UG/ML IN METHANOL	
Ecology - soil	Not degradable in the soil.

100% METHANOL UNLABELED (67-56-1)	
Ecology - soil	Not degradable in the soil.

12.5. Results of PBT and vPvB assessment

N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED (MIX OF ISOMERS) 50 UG/ML IN METHANOL
PBT: not relevant – no registration required

100% METHANOL UNLABELED (67-56-1)
PBT: not relevant – no registration required

12.6. Other adverse effects

Other adverse effects : Avoid release to the environment.

Other information : Stability in water: at 19 °C - (83 - 91%) - 72 h. Remarks: Hydrolyses on contact with water. Hydrolyses readily.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Regional legislation (waste) : Waste materials should be disposed of under conditions which meet Federal, State, and local environmental control regulations.

Product/Packaging disposal recommendations : Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Ecology - waste materials : Dispose of as unused product.

SECTION 14: Transport information

In accordance with ADR / RID / IMDG / IATA / ADN

14.1. UN number

UN-No.(DOT) : 1230

DOT NA no. UN1230

14.2. UN proper shipping name

Proper Shipping Name (DOT) : Methanol

Class (DOT) : 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120

Hazard labels (DOT) : 3 - Flammable liquid
6.1 - Poison



DOT Symbols : + - Fixes (cannot be altered) proper shipping name, hazard class, and packing group,I - Proper shipping name appropriate for international and domestic transportation

Packing group (DOT) : II - Medium Danger

DOT Special Provisions (49 CFR 172.102) : IB2 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1). Additional Requirement: Only liquids with a vapor pressure less than or equal to 110 kPa at 50 C (1.1 bar at 122 F), or 130 kPa at 55 C (1.3 bar at 131 F) are authorized.
T7 - 4 178.274(d)(2) Normal..... 178.275(d)(3)
TP2 - a. The maximum degree of filling must not exceed the degree of filling determined by the following: (image) Where: tr is the maximum mean bulk temperature during transport, tf is the temperature in degrees celsius of the liquid during filling, and a is the mean coefficient of cubical expansion of the liquid between the mean temperature of the liquid during filling (tf) and the maximum mean bulk temperature during transportation (tr) both in degrees celsius. b. For liquids transported under ambient conditions may be calculated using the formula: (image) Where: d15 and d50 are the densities (in units of mass per unit volume) of the liquid at 15 C (59 F) and 50 C (122 F), respectively.

DOT Packaging Exceptions (49 CFR 173.xxx) : 150

DOT Packaging Non Bulk (49 CFR 173.xxx) : 202

DOT Packaging Bulk (49 CFR 173.xxx) : 242

DOT RQ : 5000 lbs

Marine pollutant : No

14.3. Additional information

Emergency Response Guide (ERG) Number : 131

Other information : No supplementary information available.

Overland transport

Packing group (ADR) : II

Class (ADR) : 3 - Flammable liquid

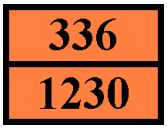
Hazard identification number (Kemler No.) : 336

Classification code (ADR) : FT1

Hazard labels (ADR) : 3 - Flammable liquids
6.1 - Toxic substances



Orange plates :



Tunnel restriction code (ADR)	:	D/E
Limited quantities (ADR)		1l
Excepted quantities (ADR)	:	E2

Transport by sea

DOT Vessel Stowage Location	:	B - (i) The material may be stowed ‘‘on deck’’ or ‘‘under deck’’ on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length; and (ii) ‘‘On deck only’’ on passenger vessels in which the number of passengers specified in paragraph (k)(2)(i) of this section is exceeded.
DOT Vessel Stowage Other	:	40 - Stow ‘‘clear of living quarters’’
MFAG-No	:	131

Air transport

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)	:	1 L
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)	:	60 L
Civil Aeronautics Law	:	Flammable liquids

14.4. Environmental hazards

Other information : No supplementary information available.

14.5. Special precautions for user

14.6. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

SECTION 15: Regulatory information

15.1. US Federal regulations

N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED (MIX OF ISOMERS) 50 UG/ML IN METHANOL	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
CERCLA RQ	5000 lb
SARA Section 302 Threshold Planning Quantity (TPQ)	Not subject to reporting requirements of the United States SARA Section 302.
SARA Section 311/312 Hazard Classes	Fire hazard Immediate (acute) health hazard Delayed (chronic) health hazard
SARA Section 313 - Emission Reporting	Subject to reporting requirements of United States SARA Section 313

N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED - (2355-31-9)	
SARA Section 302 Threshold Planning Quantity (TPQ)	Not subject to reporting requirements of the United States SARA Section 302.
SARA Section 313 - Emission Reporting	Not subject to reporting requirements of the United States SARA Section 313.

100% METHANOL UNLABELED (67-56-1)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
CERCLA RQ	5000 lb
SARA Section 302 Threshold Planning Quantity (TPQ)	Not subject to reporting requirements of the United States SARA Section 302.
SARA Section 311/312 Hazard Classes	Fire hazard Immediate (acute) health hazard Delayed (chronic) health hazard
SARA Section 313 - Emission Reporting	Subject to reporting requirements of United States SARA Section 313

15.2. International regulations

CANADA

N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED (MIX OF ISOMERS) 50 UG/ML IN METHANOL
Listed on the Canadian DSL (Domestic Substances List)

100% METHANOL UNLABELED (67-56-1)
Listed on the Canadian DSL (Domestic Substances List)

15.2.1. National regulations

No additional information available

15.3. US State regulations

N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED (MIX OF ISOMERS) 50 UG/ML IN METHANOL**()**	
U.S. - California - Proposition 65 - Carcinogens List	No
U.S. - California - Proposition 65 - Developmental Toxicity	Yes
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No
State or local regulations	U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Acceptable Ambient Concentrations U.S. - Massachusetts - Right To Know List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - New York - Reporting of Releases Part 597 - List of Hazardous Substances

N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED - (2355-31-9)				
U.S. - California - Proposition 65 - Carcinogens List	U.S. - California - Proposition 65 - Developmental Toxicity	U.S. - California - Proposition 65 - Reproductive Toxicity - Female	U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No significant risk level (NSRL)
No	No	No	No	

100% METHANOL UNLABELED (67-56-1)				
U.S. - California - Proposition 65 - Carcinogens List	U.S. - California - Proposition 65 - Developmental Toxicity	U.S. - California - Proposition 65 - Reproductive Toxicity - Female	U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No significant risk level (NSRL)
No	Yes	No	No	

N-METHYLPERFLUOROOCTANESULFONAMIDOACETIC ACID UNLABELED - (2355-31-9)
State or local regulations
U.S. - Pennsylvania - RTK (Right to Know) List U.S. - New Jersey - Right to Know Hazardous Substance List

100% METHANOL UNLABELED (67-56-1)
State or local regulations
U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Acceptable Ambient Concentrations U.S. - Massachusetts - Right To Know List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - New York - Reporting of Releases Part 597 - List of Hazardous Substances

SECTION 16: Other information

Other information : This product is not radioactive. The data given for this product are those of the corresponding unlabeled compound, unless specifically indicated otherwise. Health and safety data for labeled compounds are generally not available, but are assumed to be similar or identical to the corresponding unlabeled compound.

Full text of R-, H- and EUH-phrases:

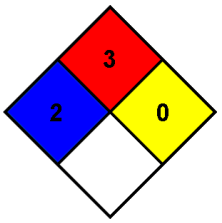
Acute Tox. 3 (Dermal)	Acute toxicity (dermal) Category 3
Acute Tox. 3 (Inhalation:vapour)	Acute toxicity (inhalation:vapour) Category 3
Acute Tox. 3 (Oral)	Acute toxicity (oral) Category 3
Eye Irrit. 2	Serious eye damage/eye irritation Category 2
Flam. Liq. 2	Flammable liquids Category 2
Skin Irrit. 2	Skin corrosion/irritation Category 2
STOT SE 1	Specific target organ toxicity (single exposure) Category 1
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H225	Highly flammable liquid and vapour
H301	Toxic if swallowed

H311	Toxic in contact with skin
H315	Causes skin irritation
H319	Causes serious eye irritation
H331	Toxic if inhaled
H335	May cause respiratory irritation
H370	Causes damage to organs
R11	Highly flammable
R36/37/38	Irritating to eyes, respiratory system and skin
R36/38	Irritating to eyes and skin
R39/23/24/25	Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed
F	Highly flammable
T	Toxic
Xi	Irritant

NFPA health hazard : 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.

NFPA fire hazard : 3 - Liquids and solids (including finely divided suspended solids) that can be ignited under almost all ambient temperature conditions.

NFPA reactivity : 0 - Material that in themselves are normally stable, even under fire conditions.



Hazard Rating

Health : 2 Moderate Hazard - Temporary or minor injury may occur

Flammability : 3 Serious Hazard

Physical : 0 Minimal Hazard

CIL Mixture SDS

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product

SAFETY DATA SHEET

Version 5.4
Revision Date 11/03/2015
Print Date 04/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 2,2,4-Trimethylpentane

Product Number : 360597
Brand : Sigma-Aldrich
Index-No. : 601-009-00-8

CAS-No. : 540-84-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Skin irritation (Category 2), H315
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Aspiration hazard (Category 1), H304
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H304 May be fatal if swallowed and enters airways.
H315 Causes skin irritation.
H336 May cause drowsiness or dizziness.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.

P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312	Call a POISON CENTER or doctor/ physician if you feel unwell.
P321	Specific treatment (see supplemental first aid instructions on this label).
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Isooctane
Formula	:	C_8H_{18}
Molecular weight	:	114.23 g/mol
CAS-No.	:	540-84-1
EC-No.	:	208-759-1
Index-No.	:	601-009-00-8
Registration number	:	01-2119457965-22-XXXX

Hazardous components

Component	Classification	Concentration
2,2,4-Trimethylpentane		
	Flam. Liq. 2; Skin Irrit. 2; STOT SE 3; Asp. Tox. 1; Aquatic Acute 1; Aquatic Chronic 1; H225, H304, H315, H336, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Nature of decomposition products not known.
Carbon oxides
Flash back possible over considerable distance., Container explosion may occur under fire conditions.

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
2,2,4-Trimethylpentane	540-84-1	TWA	300.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation		

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm
Break through time: 482 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 90 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -107 °C (-161 °F)
f)	Initial boiling point and boiling range	98 - 99 °C (208 - 210 °F)
g)	Flash point	-12 °C (10 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 6 %(V) Lower explosion limit: 1 %(V)
k)	Vapour pressure	55 hPa (41 mmHg) at 21 °C (70 °F) 117 hPa (88 mmHg) at 37.80 °C (100.04 °F)
l)	Vapour density	3.94 - (Air = 1.0)
m)	Relative density	0.692 g/mL at 25 °C (77 °F)
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	log Pow: 4.6
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Relative vapour density	3.94 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - > 5,000 mg/kg
(OECD Test Guideline 401)

LC50 Inhalation - Rat - 4 h - > 33.52 mg/l
(OECD Test Guideline 403)

LD50 Dermal - Rabbit - > 2,000 mg/kg
(OECD Test Guideline 402)

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Irritating to skin.
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity

Rat
Unscheduled DNA synthesis

Carcinogenicity

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
The substance or mixture is known to cause human aspiration toxicity hazards or has to be regarded as if it causes a human aspiration toxicity hazard.

Additional Information
RTECS: SA3320000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Liver - Irregularities - Based on Human Evidence
Liver - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1262 Class: 3 Packing group: II
Proper shipping name: Octanes
Reportable Quantity (RQ): 1000 lbs
Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG
UN number: 1262 Class: 3 Packing group: II EMS-No: F-E, S-E
Proper shipping name: OCTANES
Marine pollutant:yes

IATA
UN number: 1262 Class: 3 Packing group: II
Proper shipping name: Octanes

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
2,2,4-Trimethylpentane	540-84-1	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
2,2,4-Trimethylpentane	540-84-1	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
2,2,4-Trimethylpentane	540-84-1	2007-03-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Asp. Tox.	Aspiration hazard
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H336	May cause drowsiness or dizziness.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
Skin Irrit.	Skin irritation

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information
Copyright 2015 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.4 Revision Date: 11/03/2015 Print Date: 04/01/2016

SAFETY DATA SHEET

Version 4.5
Revision Date 01/18/2016
Print Date 02/09/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 2,4-Dimethylphenol

Product Number : D174203
Brand : Aldrich
Index-No. : 604-006-00-X

CAS-No. : 105-67-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Dermal (Category 3), H311
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Acute aquatic toxicity (Category 2), H401

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H301 + H311 Toxic if swallowed or in contact with skin
H314 Causes severe skin burns and eye damage.
H401 Toxic to aquatic life.

Precautionary statement(s)
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face

	protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/ physician.
P322	Specific measures (see supplemental first aid instructions on this label).
P361	Remove/Take off immediately all contaminated clothing.
P363	Wash contaminated clothing before reuse.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : 4-Hydroxy-*m*-xylene
asym.-*m*-Xylenol

Formula : $C_8H_{10}O$
Molecular weight : 122.16 g/mol
CAS-No. : 105-67-9
EC-No. : 203-321-6
Index-No. : 604-006-00-X

Hazardous components

Component	Classification	Concentration
2,4-Xylenol		
	Acute Tox. 3; Skin Corr. 1B; Eye Dam. 1; Aquatic Acute 2; H301 + H311, H314, H401	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 60 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Semi-solid melting to a liquid, clear Colour: brown
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 22 - 23 °C (72 - 73 °F) - lit.
f)	Initial boiling point and boiling range	211 - 212 °C (412 - 414 °F) - lit.
g)	Flash point	94.0 °C (201.2 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	0.1 hPa (0.1 mmHg) at 25.0 °C (77.0 °F)
l)	Vapour density	No data available

m)	Relative density	1.011 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 2.35
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Bases, Acid chlorides, Acid anhydrides, Oxidizing agents, Brass, Copper

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 3,200 mg/kg

Inhalation: No data available

LD50 Dermal - Rat - 1,040 mg/kg

No data available

Skin corrosion/irritation
Causes burns.

Serious eye damage/eye irritation
Risk of serious damage to eyes.

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: ZE5600000

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 9.2 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 2.1 mg/l - 48 h

12.2 Persistence and degradability

12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 28 d - 0.0102 mg/l
	Bioconcentration factor (BCF): 150

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2261 Class: 6.1 Packing group: II
Proper shipping name: Xylenols, solid
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 2261 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: XYLENOLS, SOLID

IATA
UN number: 2261 Class: 6.1 Packing group: II
Proper shipping name: Xylenols, solid

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
2,4-Xylenol	105-67-9	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
2,4-Xylenol	105-67-9	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
2,4-Xylenol	105-67-9	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
2,4-Xylenol	105-67-9	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Eye Dam.	Serious eye damage
H301	Toxic if swallowed.
H301 + H311	Toxic if swallowed or in contact with skin
H311	Toxic in contact with skin.
H314	Causes severe skin burns and eye damage.

HMIS Rating
Health hazard: 3
Chronic Health Hazard:
Flammability: 1

Physical Hazard	0

NFPA Rating

Health hazard:	3
Fire Hazard:	1
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.5 Revision Date: 01/18/2016 Print Date: 02/09/2016

SAFETY DATA SHEET

Creation Date 13-Apr-2009 **Revision Date** 24-Dec-2021 **Revision Number** 7

1. Identification

Product Name **2-Butanone**

Cat No. : **AC149670000; AC149670010; AC149670025; AC149670051; AC149670250; AC149670251**

CAS No 78-93-3
Synonyms Methyl ethyl ketone; MEK; Ethyl methyl ketone

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver.	

Label Elements

Signal Word
Danger

Hazard Statements

Highly flammable liquid and vapor
Causes serious eye irritation
May cause drowsiness or dizziness
May cause damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Wear protective gloves/protective clothing/eye protection/face protection
Keep cool
Response
Get medical attention/advice if you feel unwell
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell
Skin
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store in a well-ventilated place. Keep container tightly closed
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Repeated exposure may cause skin dryness or cracking
Other hazards
Contains a known or suspected endocrine disruptor.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Methyl ethyl ketone	78-93-3	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get

	medical attention.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Get medical attention if symptoms occur.
Inhalation	Remove to fresh air. Get medical attention if symptoms occur. If not breathing, give artificial respiration.
Ingestion	Do NOT induce vomiting. Get medical attention.
Most important symptoms and effects	Difficulty in breathing. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting: Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	CO_2, dry chemical, dry sand, alcohol-resistant foam. Water mist may be used to cool closed containers.
Unsuitable Extinguishing Media	Water may be ineffective
Flash Point	-7 °C / 19.4 °F
Method -	CC (closed cup)
Autoignition Temperature	404 °C / 759.2 °F
Explosion Limits	
Upper	11.4 vol %
Lower	1.4 vol %
Oxidizing Properties	Not oxidising
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Flammable. Risk of ignition. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Containers may explode when heated. Thermal decomposition can lead to release of irritating gases and vapors. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2).
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	3	1	N/A

6. Accidental release measures

Personal Precautions	Use personal protective equipment as required. Remove all sources of ignition. Take precautionary measures against static discharges. Avoid contact with skin, eyes or clothing. Ensure adequate ventilation.
Environmental Precautions	Avoid release to the environment. See Section 12 for additional Ecological Information.
Methods for Containment and Clean Up	Remove all sources of ignition. Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling

Wear personal protective equipment/face protection. Ensure adequate ventilation. Use spark-proof tools and explosion-proof equipment. Avoid contact with skin, eyes or clothing. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharges. Use only non-sparking tools. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded.

Storage.

Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, sparks and flame. Flammables area. Incompatible Materials. Strong oxidizing agents. Strong acids. Strong bases. Strong reducing agents. Ammonia. copper. Amines.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Methyl ethyl ketone	TWA: 200 ppm STEL: 300 ppm	(Vacated) TWA: 200 ppm (Vacated) TWA: 590 mg/m³ (Vacated) STEL: 300 ppm (Vacated) STEL: 885 mg/m³ TWA: 200 ppm TWA: 590 mg/m³	IDLH: 3000 ppm TWA: 200 ppm TWA: 590 mg/m³ STEL: 300 ppm STEL: 885 mg/m³	TWA: 200 ppm STEL: 300 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures

Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting equipment. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection

Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	Characteristic - sweet
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-87 °C / -124.6 °F
Boiling Point/Range	80 °C / 176 °F
Flash Point	-7 °C / 19.4 °F
Method -	CC (closed cup)

Evaporation Rate	3.7
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	11.4 vol %
Lower	1.4 vol %
Vapor Pressure	105 mbar @ 20 °C
Vapor Density	2.41
Specific Gravity	0.806
Solubility	Soluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	404 °C / 759.2 °F
Decomposition Temperature	No information available
Viscosity	0.42 mPa.s @ 15°C
Molecular Formula	C4 H8 O
Molecular Weight	72.11

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Hygroscopic.

Conditions to Avoid Incompatible products. Excess heat. Keep away from open flames, hot surfaces and sources of ignition. Exposure to moist air or water.

Incompatible Materials Strong oxidizing agents, Strong acids, Strong bases, Strong reducing agents, Ammonia, copper, Amines

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Methyl ethyl ketone	LD50 = 2483 mg/kg (Rat)	LD50 = 5000 mg/kg (Rabbit)	LC50 = 11700 ppm (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Methyl ethyl ketone	78-93-3	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects Not mutagenic in AMES Test

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)
STOT - repeated exposure Kidney Liver

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting: Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Methyl ethyl ketone	Not listed	Lepomis macrochirus: LC50=3,22 g/L 96 h	EC50 = 3403 mg/L 30 min EC50 = 3426 mg/L 5 min	EC50: = 5091 mg/L, 48h (Daphnia magna) EC50: 4025 - 6440 mg/L, 48h Static (Daphnia magna) EC50: > 520 mg/L, 48h (Daphnia magna)

Persistence and Degradability Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility.

Component	log Pow
Methyl ethyl ketone	0.29

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Methyl ethyl ketone - 78-93-3	U159	-

14. Transport information

DOT

UN-No UN1193
Proper Shipping Name Ethyl methyl ketone
Hazard Class 3
Packing Group II

TDG

UN-No UN1193
Proper Shipping Name ETHYL METHYL KETONE
Hazard Class 3
Packing Group II

IATA

UN-No UN1193
Proper Shipping Name Methyl ethyl ketone
Hazard Class 3

Packing Group II

IMDG/IMO

UN-No UN1193
Proper Shipping Name Ethyl methyl ketone (Methyl ethyl ketone)
Hazard Class 3
Packing Group II

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Methyl ethyl ketone	78-93-3	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Methyl ethyl ketone	78-93-3	X	-	201-159-0	X	X	X	X	X	KE-24094

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313 Not applicable

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Methyl ethyl ketone	5000 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Methyl ethyl ketone	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ):	Y
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade Serious risk, Grade 3

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Methyl ethyl ketone	-	Use restricted. See item 75. (see link for restriction details)	-

https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Methyl ethyl ketone	78-93-3	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Methyl ethyl ketone	78-93-3	Not applicable	Not applicable	Not applicable	Annex I - Y42

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 13-Apr-2009
Revision Date 24-Dec-2021
Print Date 24-Dec-2021
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Version 6.8
Revision Date 09/08/2024
Print Date 09/09/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : 2-Hexanone

Product Number : 02473
Brand : Sigma-Aldrich
Index-No. : 606-030-00-6
CAS-No. : 591-78-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 3), H226
Reproductive toxicity (Category 2), H361
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Specific target organ toxicity - repeated exposure (Category 1), H372

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Danger

Hazard Statements

H226	Flammable liquid and vapor.
H336	May cause drowsiness or dizziness.
H361	Suspected of damaging fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe mist or vapors.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

---

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Butyl methyl ketone

The life science business of Merck KGaA, Darmstadt, Germany
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Formula	:	$C_6H_{12}O$
Molecular weight	:	100.16 g/mol
CAS-No.	:	591-78-6
EC-No.	:	209-731-1
Index-No.	:	606-030-00-6

Component	Classification	Concentration
Methyl butyl ketone		
	Flam. Liq. 3; Repr. 2; STOT SE 3; STOT RE 1; H226, H361, H336, H372	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

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5.2 Special hazards arising from the substance or mixture

Carbon oxides
Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air at elevated temperatures.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information

Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions

The life science business of Merck KGaA, Darmstadt, Germany
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Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Methyl butyl ketone	591-78-6	TWA	100 ppm 410 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Danger of cutaneous absorption		
		STEL	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Danger of cutaneous absorption		
		TWA	5 ppm 20 mg/m3	USA. Table Z-1-A Limits for Air Contaminants (1989 vacated values)
		TWA	1 ppm 4 mg/m3	USA. NIOSH Recommended Exposure Limits
		PEL	1 ppm 4 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		
		STEL	10 ppm 40 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

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Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
required

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter type ABEK
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: clear, liquid Color: colorless
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: -57 °C (-71 °F) - lit.
f)	Initial boiling point and boiling range	127 °C 261 °F - lit.
g)	Flash point	23 °C (73 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 8.1 %(V) Lower explosion limit: 1.3 %(V)
k)	Vapor pressure	1,013 hPa at 127.5 °C (261.5 °F) 13 hPa at 39 °C(102 °F)
l)	Vapor density	3.46 - (Air = 1.0)

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m)	Density	0.812 g/mL at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	slightly soluble
o)	Partition coefficient: n-octanol/water	log Pow: 1.38
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

Surface tension	25.49 mN/m at 20 °C (68 °F)
Relative vapor density	3.46 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
Vapor/air-mixtures are explosive at intense warming.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heating.

10.5 Incompatible materials
Oxidizing agents, Strong bases

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 2,590 mg/kg
LC50 Inhalation - Rat - 4 h - 8000 ppm - vapor

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LD50 Dermal - Rabbit - 4,800 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: Mild skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation - 24 h

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
Overexposure may cause reproductive disorder(s) based on tests with laboratory animals. Suspected of damaging fertility.

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

11.2 Additional Information

RTECS: MP1400000
narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 428 mg/l - 96 h

12.2 Persistence and degradability
No data available

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12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 1224 Class: 3 Packing group: III
Proper shipping name: Ketones, liquid, n.o.s. (Methyl butyl ketone)
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 1224 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: KETONES, LIQUID, N.O.S. (Methyl butyl ketone)

IATA
UN number: 1224 Class: 3 Packing group: III
Proper shipping name: Ketones, liquid, n.o.s. (Methyl butyl ketone)

SECTION 15: Regulatory information

CERCLA Reportable Quantity
This material does not contain any components with a CERCLA RQ.

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SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards	:	Fire Hazard Chronic Health Hazard
SARA 313	:	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know

Methyl butyl ketone	591-78-6

Pennsylvania Right To Know

Methyl butyl ketone	591-78-6

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

California Prop. 65

WARNING: This product can expose you to chemicals including Methyl butyl ketone, which is/are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA	:	All substances listed as active on the TSCA inventory

TSCA list

The following substance(s) is/are subject to a Significant New Use Rule:

Methyl butyl ketone	591-78-6	See 40 CFR § 721.4925; Final Rule

The following substance(s) is/are subject to TSCA 12(b) export notification requirements:

Methyl butyl ketone	591-78-6

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SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.8 Revision Date: 09/08/2024 Print Date: 09/09/2024

The life science business of Merck KGaA, Darmstadt, Germany
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Fisher Scientific

Part of Thermo Fisher Scientific

SAFETY DATA SHEET

Revision Date 10-Feb-2015 **Revision Number** 1

1. Identification

Product Name **2-Methylnaphthalene, 99% (gc)**

Cat No. : **AC414551000; AC414555000**

Synonyms No information available

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute oral toxicity	Category 4
Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word
Warning

Hazard Statements
Harmful if swallowed
Causes skin irritation
Causes serious eye irritation
May cause respiratory irritation



Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Wear protective gloves/protective clothing/eye protection/face protection
Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Storage
Store in a well-ventilated place. Keep container tightly closed
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Toxic to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
2-Methylnaphthalene	91-57-6	99.0

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes.

Inhalation Move to fresh air.

Ingestion Do not induce vomiting.

Most important symptoms/effects No information available.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
None known
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	1	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up No information available.

7. Handling and storage

Handling Ensure adequate ventilation.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
2-Methylnaphthalene	TWA: 0.5 ppm Skin		

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
2-Methylnaphthalene			TWA: 0.5 ppm Skin

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	No information available
Odor	Odorless
Odor Threshold	No information available
pH	
Melting Point/Range	37 38 °C
Boiling Point/Range	°C
Flash Point	
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	< 1 mmHg @ 25 °C
Vapor Density	No information available
Relative Density	1.0000
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C11H10
Molecular Weight	142.20

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products None under normal use conditions

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
2-Methylnaphthalene	1630 mg/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
2-Methylnaphthalene	91-57-6	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity
Do not empty into drains.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
2-Methylnaphthalene	Not listed	Pimephales promelas:LC50 = 2.5mg/L	Not listed	EC50 = 1.5 mg/L/48h

Persistence and Degradability No information available
Bioaccumulation/ Accumulation No information available.

Mobility No information available.

Component	log Pow
2-Methylnaphthalene	3.86

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT Not regulated
TDG Not regulated
IATA Not regulated
IMDG/IMO Not regulated

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
2-Methylnaphthalene	X	X	-	202-078-3	-		X	X	X	X	-

Legend:

X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
2-Methylnaphthalene	-	X	-	-	-

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class D1B Toxic materials

D2B Toxic materials



16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Revision Date 10-Feb-2015
Print Date 10-Feb-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

SAFETY DATA SHEET

Version 5.1
Revision Date 06/26/2014
Print Date 05/11/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 4,4′-DDD

Product Number : 35486
Brand : Sigma-Aldrich

CAS-No. : 72-54-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Dermal (Category 4), H312
Carcinogenicity (Category 2), H351
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H301 Toxic if swallowed.
H312 Harmful in contact with skin.
H351 Suspected of causing cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.

P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P322	Specific measures (see supplemental first aid instructions on this label).
P330	Rinse mouth.
P363	Wash contaminated clothing before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane TDE
Formula	:	$C_{14}H_{10}Cl_4$
Molecular Weight	:	320.04 g/mol
CAS-No.	:	72-54-8
EC-No.	:	200-783-0

Hazardous components

Component	Classification	Concentration
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane		
	Acute Tox. 3; Acute Tox. 4; Carc. 2; Aquatic Acute 1; Aquatic Chronic 1; H301, H312, H351, H410	-

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Carbon oxides, Hydrogen chloride gas
Nature of decomposition products not known.

5.3 Advice for firefighters

Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information

no data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.Normal measures for preventive fire protection.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	no data available
c)	Odour Threshold	no data available
d)	pH	no data available
e)	Melting point/freezing point	94.0 - 96.0 °C (201.2 - 204.8 °F)
f)	Initial boiling point and boiling range	193.0 °C (379.4 °F) at 1.3 hPa (1.0 mmHg)
g)	Flash point	no data available
h)	Evapouration rate	no data available
i)	Flammability (solid, gas)	no data available
j)	Upper/lower flammability or explosive limits	no data available
k)	Vapour pressure	< 0.00001 hPa (< 0.00001 mmHg) at 25.0 °C (77.0 °F)
l)	Vapour density	no data available
m)	Relative density	1.38 g/cm3
n)	Water solubility	no data available
o)	Partition coefficient: n-octanol/water	log Pow: 6.02
p)	Auto-ignition temperature	no data available
q)	Decomposition temperature	no data available
r)	Viscosity	no data available
s)	Explosive properties	no data available
t)	Oxidizing properties	no data available

9.2 Other safety information
no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Hamster - > 5,000 mg/kg

TDLo Oral - Human - 428.5 mg/kg
Remarks: Endocrine:Adrenal cortex hypoplasia.

TDLo Oral - rat - 6,000 mg/kg
Remarks: Cardiac:Other changes. Gastrointestinal:Other changes. Kidney, Ureter, Bladder:Changes in both tubules and glomeruli.

TDLo Oral - rat - 14 mg/kg
Remarks: Liver:Changes in liver weight. Endocrine:Estrogenic. Musculoskeletal:Other changes.

TDLo Oral - rat - 2,100 mg/kg
Remarks: Behavioral:Altered sleep time (including change in righting reflex).

Inhalation: no data available

LD50 Dermal - rabbit - 1,200 mg/kg
Remarks: Behavioral:Excitement. Behavioral:Convulsions or effect on seizure threshold. Skin irritation

no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as

probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: KI0700000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - other fish - 1.18 - 9 mg/l - 96.0 h
	LC50 - Lepomis macrochirus (Bluegill) - 0.04 - 0.05 mg/l - 96.0 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.06 - 0.09 mg/l - 96.0 h
	LC50 - Pimephales promelas (fathead minnow) - 3.47 - 5.58 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia pulex (Water flea) - 0.01 mg/l - 48 h

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
Indication of bioaccumulation.

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)
Marine pollutant: No

IATA
UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)

15. REGULATORY INFORMATION

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	72-54-8	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	72-54-8	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	72-54-8	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H301	Toxic if swallowed.
H312	Harmful in contact with skin.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.1 Revision Date: 06/26/2014 Print Date: 05/11/2016

SAFETY DATA SHEET

Version 4.5
Revision Date 04/24/2015
Print Date 10/25/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 4-Chlorotoluene

Product Number : 111929
Brand : Aldrich
Index-No. : 602-040-00-X

CAS-No. : 106-43-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 3), H226
Acute toxicity, Inhalation (Category 4), H332
Skin sensitisation (Category 1), H317
Acute aquatic toxicity (Category 2), H401
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H226 Flammable liquid and vapour.
H317 May cause an allergic skin reaction.
H332 Harmful if inhaled.
H411 Toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.

P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P271	Use only outdoors or in a well-ventilated area.
P272	Contaminated work clothing should not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P363	Wash contaminated clothing before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P391	Collect spillage.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	C_7H_7Cl
Molecular weight	:	126.58 g/mol
CAS-No.	:	106-43-4
EC-No.	:	203-397-0
Index-No.	:	602-040-00-X

Hazardous components

Component	Classification	Concentration
4-Chlorotoluene		
	Flam. Liq. 3; Acute Tox. 4; Skin Sens. 1; Aquatic Acute 2; Aquatic Chronic 2; H226, H317, H332, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 6 - 8 °C (43 - 46 °F) - lit.
f)	Initial boiling point and boiling range	162 °C (324 °F) - lit.
g)	Flash point	53.0 °C (127.4 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available

j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	13.3 hPa (10.0 mmHg) at 45.0 °C (113.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.07 g/mL at 25 °C (77 °F)
n)	Water solubility	slightly soluble
o)	Partition coefficient: n-octanol/water	log Pow: 3.32
p)	Auto-ignition temperature	570 °C (1,058 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - female - 2,389 mg/kg

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation - 24 h

Respiratory or skin sensitisation
Maximisation Test (GPMT) - Guinea pig
Result: May cause sensitisation by skin contact.

Germ cell mutagenicity
Ames test
S. typhimurium
Result: negative

Mutagenicity (micronucleus test)
Mouse - male and female
Result: negative

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information

Repeated dose toxicity - Rat - male and female - No observed adverse effect level - 200 mg/kg
RTECS: XS9010000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Kidney -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oryzias latipes - 6.1 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 2 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	Growth inhibition EC50 - Selenastrum capricornutum (green algae) - 6.1 mg/l - 72 h (OECD Test Guideline 201)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 1 % - Not biodegradable (OECD Test Guideline 301F)

12.3 Bioaccumulative potential

Bioaccumulation Cyprinus carpio (Carp) - 56 d
- 0.3 mg/l

Bioconcentration factor (BCF): 21.8 - 76.5
(OECD Test Guideline 305C)

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2238 Class: 3 Packing group: III
Proper shipping name: Chlorotoluenes
Reportable Quantity (RQ):

Poison Inhalation Hazard: No

IMDG
UN number: 2238 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: CHLOROTOLUENES

IATA
UN number: 2238 Class: 3 Packing group: III
Proper shipping name: Chlorotoluenes

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
4-Chlorotoluene	106-43-4	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
4-Chlorotoluene	106-43-4	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
4-Chlorotoluene	106-43-4	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.
H317	May cause an allergic skin reaction.
H332	Harmful if inhaled.
H401	Toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	2
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	2
Reactivity Hazard:	0

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.5 Revision Date: 04/24/2015 Print Date: 10/25/2016

SAFETY DATA SHEET

Version 6.7
Revision Date 08/05/2024
Print Date 08/06/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : *p*-Cymene

Product Number : W235601
Brand : Aldrich
Index-No. : 601-094-00-1
CAS-No. : 99-87-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 3), H226
Acute toxicity, Inhalation (Category 3), H331
Reproductive toxicity (Category 2), H361

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Aspiration hazard (Category 1), H304
Short-term (acute) aquatic hazard (Category 2), H401
Long-term (chronic) aquatic hazard (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Danger

Hazard Statements

H226	Flammable liquid and vapor.
H304	May be fatal if swallowed and enters airways.
H331	Toxic if inhaled.
H361	Suspected of damaging fertility or the unborn child.
H411	Toxic to aquatic life with long lasting effects.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing mist or vapors.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P331	Do NOT induce vomiting.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

May form explosive peroxides.

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SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : 1-Isopropyl-4-methylbenzene
4-Isopropyltoluene

Formula : $C_{10}H_{14}$
Molecular weight : 134.22 g/mol
CAS-No. : 99-87-6
EC-No. : 202-796-7
Index-No. : 601-094-00-1

Component	Classification	Concentration
p-Cymene		
	Flam. Liq. 3; Acute Tox. 3; Repr. 2; Asp. Tox. 1; Aquatic Acute 2; Aquatic Chronic 2; H226, H331, H361, H304, H401, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

No data available

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

No data available

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Combustible.

5.3 Advice for firefighters

No data available

5.4 Further information

No data available

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SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
For personal protection see section 8.

6.2 Environmental precautions
No data available

6.3 Methods and materials for containment and cleaning up
No data available

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
No data available

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls
No data available

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Color: colorless
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/freezing point: < -20 °C (< -4 °F) - OECD Test Guideline 102
f)	Initial boiling point	176 - 178 °C 349 - 352 °F - lit.

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	and boiling range	
g)	Flash point	52 °C (126 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 5.6 %(V) Lower explosion limit: 0.7 %(V)
k)	Vapor pressure	3.6 hPa at 25 °C (77 °F) - OECD Test Guideline 104
l)	Vapor density	No data available
m)	Density	0.86 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	0.015 g/l at 20 °C (68 °F) - OECD Test Guideline 105
o)	Partition coefficient: n-octanol/water	log Pow: 4.8 at ca.20 °C (ca.68 °F) - OECD Test Guideline 117
p)	Autoignition temperature	> 400 °C (> 752 °F) at 994 hPa
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

Solubility in other solvents	Alcohol - soluble

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.
Test for peroxide formation before distillation or evaporation. Test for peroxide formation or discard after 1 year.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

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10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 4,750 mg/kg
Acute toxicity estimate Inhalation - 4 h - 3 mg/l - vapor

(Expert judgment)
Remarks: (Regulation (EC) No 1272/2008, Annex VI)
LD50 Dermal - Rabbit - > 5,000 mg/kg
Remarks: (ECHA)
No data available

Skin corrosion/irritation
Remarks: No data available
Skin - reconstructed human epidermis (RhE)
Result: No skin irritation
(OECD Test Guideline 439)

Serious eye damage/eye irritation
Eyes - Humans
Result: No eye irritation
(OECD Test Guideline 492)

Respiratory or skin sensitization
Local lymph node assay (LLNA) - Mouse
Result: negative
(OECD Test Guideline 429)

Germ cell mutagenicity
Test Type: Chromosome aberration test in vitro
Test system: Human lymphocytes
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473
Result: negative
Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster fibroblasts
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
Suspected of damaging fertility.

Developmental Toxicity- Rat- male and female- Oral

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
May be fatal if swallowed and enters airways.

11.2 Additional Information

Repeated dose toxicity - Rat - male - Oral - NOAEL (No observed adverse effect level) - 50 mg/kg

Repeated dose toxicity - Rat - male - Inhalation
Remarks: (ECHA)

RTECS: GZ5950000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	static test LC50 - Cyprinodon variegatus (sheepshead minnow) - 48 mg/l - 96 h (OPPTS 850.1075)
Toxicity to daphnia and other aquatic invertebrates	semi-static test EC50 - Daphnia magna (Water flea) - 3.7 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	static test EC50 - Scenedesmus capricornutum (fresh water algae) - 4.03 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to bacteria	static test NOEC - activated sludge - 100 mg/l - 28 d

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 14 d Result: 88 % - Readily biodegradable. (OECD Test Guideline 301C)

12.3 Bioaccumulative potential

No data available

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12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
No data available

SECTION 14: Transport information

DOT (US)
UN number: 2046 Class: 3 Packing group: III
Proper shipping name: Cymenes
Reportable Quantity (RQ):
Marine pollutant: yes Poison Inhalation Hazard: No

IMDG
UN number: 2046 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: CYMENES
Marine pollutant : yes
Marine pollutant : yes

IATA
UN number: 2046 Class: 3 Packing group: III
Proper shipping name: Cymenes

SECTION 15: Regulatory information

CERCLA Reportable Quantity
This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

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SARA 311/312 Hazards	:	Fire Hazard Acute Health Hazard
SARA 313	:	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know

p-Cymene	99-87-6

Pennsylvania Right To Know

p-Cymene	99-87-6

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA	:	All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.7 Revision Date: 08/05/2024 Print Date: 08/06/2024

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SAFETY DATA SHEET

Version 6.10
Revision Date 03/02/2024
Print Date 07/14/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : 4-Methyl-2-pentanone

Product Number : W273104
Brand : Aldrich
Index-No. : 606-004-00-4
CAS-No. : 108-10-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Acute toxicity, Inhalation (Category 4), H332
Eye irritation (Category 2A), H319

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Carcinogenicity, Inhalation (Category 2), H351
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Danger

Hazard Statements

H225	Highly flammable liquid and vapor.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer if inhaled.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing mist or vapors.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Repeated exposure may cause skin dryness or cracking.
May form explosive peroxides.

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SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Isobutyl methyl ketone
Methyl isobutyl ketone
Isopropylacetone

Formula : $C_6H_{12}O$
Molecular weight : 100.16 g/mol
CAS-No. : 108-10-1
EC-No. : 203-550-1
Index-No. : 606-004-00-4

Component	Classification	Concentration
4-methylpentan-2-one		
	Flam. Liq. 2; Acute Tox. 4; Eye Irrit. 2A; Carc. 2; STOT SE 3; H225, H332, H319, H351, H336 Concentration limits: 20 %: STOT SE 3, H335;	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

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4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2) Foam Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
Development of hazardous combustion gases or vapours possible in the event of fire.
Forms explosive mixtures with air at ambient temperatures.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections
For disposal see section 13.

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SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
4-methylpentan-2-one	108-10-1	STEL	75 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Confirmed animal carcinogen with unknown relevance to humans		
		TWA	50 ppm 205 mg/m3	USA. Table Z-1-A Limits for Air Contaminants (1989 vacated values)
		STEL	75 ppm 300 mg/m3	USA. Table Z-1-A Limits for Air Contaminants (1989 vacated values)
		TWA	100 ppm 410 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	20 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Confirmed animal carcinogen with unknown relevance to		

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		humans		
		TWA	50 ppm 205 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	75 ppm 300 mg/m3	USA. NIOSH Recommended Exposure Limits
		PEL	50 ppm 205 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	75 ppm 300 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
4-methylpentan-2-one	108-10-1	methyl isobutyl ketone	1 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: butyl-rubber
Minimum layer thickness: 0.7 mm
Break through time: 240 min
Material tested:Butoject® (KCL 898)

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter A (acc. to DIN 3181) for vapours of organic compounds

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The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Color: colorless
b)	Odor	characteristic
c)	Odor Threshold	0.1 ppm
d)	pH	at 20 °C (68 °F)neutral
e)	Melting point/freezing point	Melting point/range: -80 °C (-112 °F) - lit.
f)	Initial boiling point and boiling range	117 - 118 °C 243 - 244 °F - lit.
g)	Flash point	14 °C (57 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 8 %(V) Lower explosion limit: 1.2 %(V)
k)	Vapor pressure	20 hPa at 20 °C (68 °F)
l)	Vapor density	3.46 - (Air = 1.0)
m)	Density	0.801 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	14.1 g/l at 20 °C (68 °F) - OECD Test Guideline 105 - completely soluble
o)	Partition coefficient: n-octanol/water	log Pow: 1.9 - Bioaccumulation is not expected.
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available

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r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

Surface tension	23.6 mN/m at 20 °C (68 °F)
Relative vapor density	3.46 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
Stable under recommended storage conditions.
Vapors may form explosive mixture with air.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .
Stable under recommended storage conditions.
Test for peroxide formation before distillation or evaporation. Test for peroxide formation or discard after 1 year.

10.3 Possibility of hazardous reactions

Vapors may form explosive mixture with air.

10.4 Conditions to avoid
May form peroxides on contact with air.
Warming.

10.5 Incompatible materials
rubber, various plastics, Copper

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 2,080 mg/kg
(OECD Test Guideline 401)
LC50 Inhalation - Rat - male - 4 h - 11.6 mg/l - vapor

(OECD Test Guideline 403)
Dermal: No data available

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Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 4 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: slight irritation - 72 h
(OECD Test Guideline 405)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: rat hepatocytes
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 473
Result: negative
Test Type: In vitro mammalian cell gene mutation test
Test system: mouse lymphoma cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative

Test Type: Micronucleus test
Species: Mouse
Cell type: Bone marrow
Application Route: Intraperitoneal
Method: OECD Test Guideline 474
Result: negative

Carcinogenicity
Suspected of causing cancer if inhaled.

IARC:	2B - Group 2B: Possibly carcinogenic to humans (4-methylpentan-2-one)
NTP:	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness. - Respiratory Tract

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Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Gavage - 90 d - NOAEL (No observed adverse effect level) - 250 mg/kg - LOAEL (Lowest observed adverse effect level) - 1,000 mg/kg
Remarks: Subchronic toxicity

RTECS: SA9275000
Blurred vision, Dermatitis
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	static test LC50 - Danio rerio (zebra fish) - > 179 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - > 200 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	semi-static test NOEC - Daphnia - 30 - 78 mg/l - 21 d (OECD Test Guideline 211)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 83 % - Readily biodegradable. (OECD Test Guideline 301F)
Theoretical oxygen demand	2,720 mg/g Remarks: (Lit.)

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)

UN number: 1245 Class: 3 Packing group: II
Proper shipping name: Methyl isobutyl ketone
Reportable Quantity (RQ): 5000 lbs
Poison Inhalation Hazard: No

IMDG

UN number: 1245 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: METHYL ISOBUTYL KETONE

IATA

UN number: 1245 Class: 3 Packing group: II
Proper shipping name: Methyl isobutyl ketone

SECTION 15: Regulatory information

SARA 302 Components

This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

CAS-No. Revision Date

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

4-methylpentan-2-one	108-10-1	2007-03-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
4-methylpentan-2-one	108-10-1	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
4-methylpentan-2-one	108-10-1	2007-03-01

California Prop. 65 Components

	CAS-No.	Revision Date
, which is/are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.4-methylpentan-2-one	108-10-1	2011-11-18

SECTION 16: Other information

Further information
The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
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Version: 6.10 Revision Date: 03/02/2024 Print Date: 07/14/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 5.4
Revision Date 01/02/2015
Print Date 12/11/2015

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Acenaphthene

Product Number : 215376
Brand : Aldrich

CAS-No. : 83-32-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Carcinogenicity (Category 1B), H350
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H350 May cause cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.

P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear eye protection/ face protection.
P280	Wear protective gloves.
P281	Use personal protective equipment as required.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : 1,8-Ethylenenaphthalene

Formula : $C_{12}H_{10}$

Molecular weight : 154.21 g/mol

CAS-No. : 83-32-9

EC-No. : 201-469-6

Hazardous components

Component	Classification	Concentration
Acenaphthene		
	Skin Irrit. 2; Eye Irrit. 2A; Carc. 1B; STOT SE 3; Aquatic Acute 1; Aquatic Chronic 1; H315, H319, H335, H350, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator.For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 90 - 94 °C (194 - 201 °F) - lit.
f)	Initial boiling point and boiling range	279 °C (534 °F) - lit.
g)	Flash point	125.0 °C (257.0 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available

k)	Vapour pressure	13.3 hPa (10.0 mmHg) at 131.0 °C (267.8 °F)
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 3.39 - 4.19
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

LD50 Intraperitoneal - Rat - 600 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Acenaphthene)

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: Reasonably anticipated to be a human carcinogen (Acenaphthene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: AB1000000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.67 mg/l - 96.0 h
	LC50 - Pimephales promelas (fathead minnow) - 0.6 - 1.73 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 1.27 - 3.45 mg/l - 48 h
Toxicity to algae	EC50 - Pseudokirchneriella subcapitata (green algae) - 0.52 - 0.53 mg/l - 96 h

12.2 Persistence and degradability

12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 28 d - 0.00894 mg/l
	Bioconcentration factor (BCF): 387

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Acenaphthene)
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Acenaphthene)
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Acenaphthene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Acenaphthene	83-32-9	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Acenaphthene	83-32-9	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Acenaphthene	83-32-9	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Acenaphthene	83-32-9	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.

H350	May cause cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	1
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	1
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.4 Revision Date: 01/02/2015 Print Date: 12/11/2015

SAFETY DATA SHEET

Revision Date 10-Feb-2015 **Revision Number** 1

1. Identification

Product Name **Poly(acenaphthylene)**

Cat No. : **AC178020000; AC178020050; AC178020100**

Synonyms None.

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
Classification under 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Based on available data, the classification criteria are not met

Label Elements
None required

Hazards not otherwise classified (HNOC)
None identified

Unknown Acute Toxicity
.? % of the mixture consists of ingredients of unknown toxicity.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Poly(acenaphthylene)	25036-01-5	100

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated

clothes and shoes.

Inhalation Remove from exposure, lie down. Move to fresh air.

Ingestion Do not induce vomiting. Never give anything by mouth to an unconscious person. Drink plenty of water. If possible drink milk afterwards.

Most important symptoms/effects No information available.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. alcohol-resistant foam.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Thermal decomposition can lead to release of irritating gases and vapors Carbon monoxide (CO) Carbon dioxide (CO_2)
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
0	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions See Section 12 for additional ecological information.

Methods for Containment and Clean Up Sweep up or vacuum up spillage and collect in suitable container for disposal.

7. Handling and storage

Handling Avoid contact with skin and eyes. Avoid contact with clothing. Remove and wash contaminated clothing before re-use. Avoid breathing vapors or mists. Do not ingest. Wash thoroughly after handling.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ventilation systems.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Wear a NIOSH/MSHA or European Standard EN 149 approved full-facepiece airline respirator in the positive pressure mode with emergency escape provisions.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid
Appearance	Yellow
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	No data available
Boiling Point/Range	No information available
Flash Point	No information available
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	No information available
Relative Density	No information available
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Oxidizing agents

Hazardous Decomposition Products Thermal decomposition can lead to release of irritating gases and vapors, Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization No information available.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Oral LD50 Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.
Dermal LD50 Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.
Mist LC50 Based on ATE data, the classification criteria are not met. ATE > 5 mg/l.
Component Information
Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Poly(acenaphthylene)	25036-01-5	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available
Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity
Do not empty into drains.

Persistence and Degradability No information available
Bioaccumulation/ Accumulation No information available.

Mobility No information available.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT Not regulated
TDG Not regulated
IATA Not regulated
IMDG/IMO Not regulated

15. Regulatory information

International Inventories

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know Not applicable

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class Non-controlled

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Revision Date 10-Feb-2015
Print Date 10-Feb-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

SAFETY DATA SHEET

Version 6.11
Revision Date 09/06/2024
Print Date 09/07/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Acetone

Product Number : 179124
Brand : SIGALD
Index-No. : 606-001-00-8
CAS-No. : 67-64-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

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For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word: Danger

Hazard Statements

H225	Highly flammable liquid and vapor.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.

Precautionary Statements

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing mist or vapors.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Repeated exposure may cause skin dryness or cracking.

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	C_3H_6O
Molecular weight	:	58.08 g/mol
CAS-No.	:	67-64-1
EC-No.	:	200-662-2
Index-No.	:	606-001-00-8

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Component	Classification	Concentration
acetone		
	Flam. Liq. 2; Eye Irrit. 2A; STOT SE 3; H225, H319, H336 Concentration limits: >= 20 %: STOT SE 3, H336;	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2) Foam Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

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5.2 Special hazards arising from the substance or mixture

Carbon oxides
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
Development of hazardous combustion gases or vapours possible in the event of fire.
Forms explosive mixtures with air at ambient temperatures.

5.3 Advice for firefighters

In the event of fire, wear self-contained breathing apparatus.

5.4 Further information

Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material (e.g. Chemizorb®).
Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions

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Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
acetone	67-64-1	TWA	250 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not classifiable as a human carcinogen		
		STEL	500 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Not classifiable as a human carcinogen		
		TWA	250 ppm 590 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1,000 ppm 2,400 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		C	3,000 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		PEL	500 ppm 1,200 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	750 ppm 1,780 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
acetone	67-64-1	Acetone	25 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

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Derived No Effect Level (DNEL)

Application Area	Routes of exposure	Health effect	Value
Workers	Skin contact	Long-term systemic effects	186mg/kg BW/d
Consumers	Ingestion	Long-term systemic effects	62mg/kg BW/d
Consumers	Skin contact	Long-term systemic effects	62mg/kg BW/d
Workers	Inhalation	Acute systemic effects	2420 mg/m3
Workers	Inhalation	Long-term systemic effects	1210 mg/m3
Consumers	Inhalation	Long-term systemic effects	200 mg/m3

Predicted No Effect Concentration (PNEC)

Compartment	Value
Soil	33.3 mg/kg
Sea water	1.06 mg/l
Fresh water	10.6 mg/l
Sea sediment	3.04 mg/kg
Fresh water sediment	30.4 mg/kg
Onsite sewage treatment plant	100 mg/l

8.2 Exposure controls

Appropriate engineering controls
Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: butyl-rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Butoject® (KCL 898)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Latex gloves
Minimum layer thickness: 0.6 mm
Break through time: 10 min
Material tested:Lapren® (KCL 706 / Aldrich Z677558, Size M)

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Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter type AX
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: clear, liquid Color: colorless
b)	Odor	pungent, weakly aromatic
c)	Odor Threshold	0.1 ppm
d)	pH	5 - 6 at 395 g/l at 20 °C (68 °F)
e)	Melting point/freezing point	Melting point/ range: -94 °C (-137 °F) - lit.
f)	Initial boiling point and boiling range	56 °C 133 °F at 1,013 hPa - lit.
g)	Flash point	-17.0 °C (1.4 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 13 %(V) Lower explosion limit: 2 %(V)
k)	Vapor pressure	245.3 hPa at 20.0 °C (68.0 °F)
l)	Vapor density	No data available
m)	Density	0.791 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	soluble, in all proportions
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition	465.0 °C (869.0 °F)

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	temperature	
q)	Decomposition temperature	Distillable in an undecomposed state at normal pressure.
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

Conductivity	0.01 µS/cm at 20 °C (68 °F)
Surface tension	23.2 mN/m at 20.0 °C (68.0 °F)

SECTION 10: Stability and reactivity

10.1 Reactivity

Vapors may form explosive mixture with air.

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions

Risk of ignition or formation of inflammable gases or vapours with:
chromosulfuric acid
chromyl chloride
ethanolamine
Fluorine
Strong oxidizing agents
strong reducing agents
Nitric acid
chromium(VI) oxide
Risk of explosion with:
nonmetallic oxyhalides
halogen-halogen compounds
Chloroform
nitrating acid
nitrosyl compounds
hydrogen peroxide
halogen oxides
organic nitro compounds
peroxi compounds
Exothermic reaction with:
Bromine
Alkali metals
alkali hydroxides
Halogenated hydrocarbon
Sulfur dichloride
phosphorous oxichloride

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10.4 Conditions to avoid
Warming.

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - female - 5,800 mg/kg
Remarks: (ECHA)
Symptoms: Stomach/intestinal disorders, Risk of aspiration upon vomiting., Pulmonary failure possible after aspiration of vomit.
LC50 Inhalation - Rat - 4 h - 76 mg/l - vapor

Remarks: Unconsciousness
Drowsiness
Dizziness
(External MSDS)
LD50 Dermal - Rabbit - 20,000 mg/kg
Remarks: (IUCLID)

Skin corrosion/irritation
Skin - Rabbit
Result: Mild skin irritation - 24 h
(Draize Test)
Remarks: (RTECS)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation - 24 h
(Draize Test)
Remarks: (RTECS)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
Remarks: (ECHA)
Chronic exposure may cause dermatitis.

Germ cell mutagenicity
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473
Result: negative
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation

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Method: OECD Test Guideline 471
Result: negative
Test Type: In vitro mammalian cell gene mutation test
Test system: Mouse lymphoma test
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 476
Result: negative

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
Inhalation - May cause drowsiness or dizziness. - Narcotic effects
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: AL3150000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After absorption:

Headache
Salivation
Nausea
Vomiting
Dizziness
narcosis
Coma

Other dangerous properties can not be excluded.

Handle in accordance with good industrial hygiene and safety practice.

Kidney - Irregularities - Based on Human Evidence

Skin - Dermatitis - Based on Human Evidence

Kidney - Irregularities - Based on Human Evidence

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Skin - Dermatitis - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Pimephales promelas (fathead minnow) - 6,210 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	static test LC50 - Daphnia pulex (Water flea) - 8,800 mg/l - 48 h Remarks: (ECHA)
Toxicity to algae	static test NOEC - M.aeruginosa - 530 mg/l - 8 d (DIN 38412) Remarks: (maximum permissible toxic concentration) (IUCLID)
Toxicity to bacteria	static test EC50 - activated sludge - 61.15 mg/l - 30 min (OECD Test Guideline 209)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	flow-through test NOEC - Daphnia magna (Water flea) - 2,212 mg/l - 28 d Remarks: (ECHA)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 91 % - Readily biodegradable. (OECD Test Guideline 301B)
Biochemical Oxygen Demand (BOD)	1,850 mg/g Remarks: (IUCLID)
Chemical Oxygen Demand (COD)	2,070 mg/g Remarks: (IUCLID)
Theoretical oxygen demand	2,200 mg/g Remarks: (Lit.)

12.3 Bioaccumulative potential

Does not bioaccumulate.

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

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12.7 Other adverse effects

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 1090 Class: 3 Packing group: II
Proper shipping name: Acetone
Reportable Quantity (RQ): 5000 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1090 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: ACETONE

IATA
UN number: 1090 Class: 3 Packing group: II
Proper shipping name: Acetone

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
acetone	67-64-1	5000	5000

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

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SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know

acetone	67-64-1

Pennsylvania Right To Know

acetone	67-64-1

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.11 Revision Date: 09/06/2024 Print Date: 09/07/2024

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Safety Data Sheet

Revision Date: 10/21/14
www.restek.com

1. IDENTIFICATION

Catalog Number / Product Name:	**32205, 32205-5XX, & 32305 / Aldrin Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	sds@restek.com
Revision Number:	5
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:



GHS Classification:

Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 1
Flammable Liquid Category 2
Acute Toxicity - Inhalation Dust / Mist Category 3
Acute Toxicity - Inhalation Vapour Category 3
Acute Toxicity - Inhalation Gas Category 3
Acute Toxicity - Dermal Category 3
Acute Toxicity - Oral Category 3

GHS Signal Word:

Danger

GHS Hazard:

Highly flammable liquid and vapour.
Toxic if swallowed, in contact with skin or if inhaled.
Toxic if inhaled.
Causes damage to organs.

GHS Precautions:

Safety Precautions:

Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilation and lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Do not breathe dust/fume/gas/mist/vapours/spray.
Wash hands and skin thoroughly after handling.
Do no eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.

First Aid Measures:

IF SWALLOWED: Immediately call a POISON CENTER/doctor/....
IF ON SKIN: Wash with plenty of soap and water.
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF exposed: Call a POISON CENTER or doctor/physician.
Call a POISON CENTER or doctor/physician if you feel unwell.
Specific treatment see section 4.

	Specific measures see section 4. Rinse mouth. Remove/Take off immediately all contaminated clothing. Wash contaminated clothing before reuse. In case of fire: Use extinguishing media in section 5 for extinction.
Storage:	Store in a well-ventilated place. Keep container tightly closed. Store in a well-ventilated place. Keep cool. Store locked up.
Disposal:	Dispose of contents/container according to section 13 of the SDS.
Single Exposure Target Organs:	No data available.
Repeated Exposure Target Organs:	No data available.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS #	EINEC #	% Composition
methanol	67-56-1	200-659-6	99.900000
aldrin	309-00-2	206-215-8	0.100000

4. FIRST-AID MEASURES

Inhalation:	Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately
Eyes:	Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.
Skin Contact:	Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.
Ingestion:	Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media:	Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water may be ineffective but water spray can be used extinguish a fire if swept across the base of the flames. Water can absorb heat and keep exposed material from being damaged by fire.
Fire and/or Explosion Hazards:	Vapors may be ignited by sparks, flames or other sources of ignition if material is above the flash point giving rise to a fire (Class B). Vapors are heavier than air and may travel to a source of ignition and flash back.
Fire Fighting Methods and Protection:	Do not enter fire area without proper protection including self-contained breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.
Hazardous Combustion Products:	Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment:	Exposure to the spilled material may be severely irritating or toxic. Follow personal protective equipment recommendations found in Section 8 of this SDS. Personal protective equipment needs must be evaluated based on information provided on this sheet and the special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred, and the expertise of employees in the area responding to the spill. Never exceed any occupational exposure limits.
Methods for Clean-up:	Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal

protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions: Toxic or severely irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment

Storage Technical Measures and Conditions: Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
methanol	67-56-1	6000 ppm IDLH	250 ppm STEL	200 ppm TWA	200 ppm TWA; 260 mg/m3 TWA
aldrin	309-00-2	ND		0.05 mg/m3 TWA (inhalable fraction and vapor)	0.25 mg/m3 TWA

Personal Protection:

Engineering Measures: Local exhaust ventilation is recommended when generating excessive levels of vapors from handling or thermal processing.

Respiratory Protection: Respiratory protection may be required to avoid overexposure when handling this product. General or local exhaust ventilation is the preferred means of protection. Use a respirator if general room ventilation is not available or sufficient to eliminate symptoms.If an exposure limit is exceeded or if an operator is experiencing symptoms of inhalation overexposure as explained in Section 3, provide respiratory protection.

Eye Protection: Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.

Skin Protection: Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color:	No data available.
Odor:	Mild
Physical State:	No data available.
pH:	No data available
Vapor Density:	1.1 (air = 1)
Melting Point:	-98 °C
Flash Point:	52
Flammability:	Highly Flammable
Upper Flammable/Explosive Limit, % in air:	36.0
Lower Flammable/Explosive Limit, % in air:	6.0
Autoignition Temperature:	464 deg C
Decomposition Temperature:	No data available.
Specific Gravity:	0.791 - 0.792 g/cm3 at 20 °C
Evaporation Rate:	No data available.
Odor Threshold:	No data available.
Solubility:	Moderate; 50-99%
Partition Coefficient: n-octanol in water:	No data available.
VOC % by weight:	99.90
Molecular Weight:	32.04

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	No data available.
Materials to Avoid / Chemical Incompatiability:	Strong oxidizing agents
Hazardous Decomposition Products:	Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, Skin Contact, Eye Contact, Ingestion

Target Organs Potentially Affected By Exposure: Eyes, Central nervous system stimulation, Skin, GI Tract, Respiratory Tract

Chemical Interactions That Change Toxicity: None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation: Can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.

Inhalation Toxicity: Harmful! Can cause systemic damage (see "Target Organs)Methanol can cause central nervous system depression and overexposure can cause damage to the optic nerve resulting in visual impairment or blindness.

Skin Contact: Can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.

Eye Contact: Can cause moderate irritation, tearing and reddening, but not likely to permanently injure eye tissue.

Ingestion Irritation: Irritating to mouth, throat, and stomach. Can cause abdominal discomfort, nausea, vomiting and diarrhea.Highly toxic and may be fatal if swallowed.

Ingestion Toxicity: Toxic if swallowed. May cause target organ failure and/or death.May be fatal if swallowed.

Long-Term (Chronic) Health Effects:

Carcinogenicity: Contains a probable or known human carcinogen.

Reproductive and Developmental Toxicity: Contains a known human reproductive and/or developmental hazard.

Inhalation: Upon prolonged and/or repeated exposure, can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.Harmful! Can cause systemic damage upon prolonged and/or repeated exposure (see "Target Organs)

Skin Contact: Upon prolonged or repeated contact, can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.

Ingestion: Toxic if swallowed. May cause target organ failure and/or death.

Component Toxicological Data:

NIOSH:

Chemical Name	CAS No.	LD50/LC50
Methanol	67-56-1	Oral LD50 Rat 5628 mg/kg (Source: NLM_CIP); Inhalation LC50 Rat 83.2 mg/L 4 h (Source: IUCLID)

Component Carcinogenic Data:

OSHA:

Chemical Name	CAS No.
No data available.	

ACGIH:

Chemical Name	CAS No.
No data available.	

NIOSH:

Chemical Name	CAS No.
No data available.	

NTP:

Chemical Name	CAS No.
No data available.	

IARC:

Chemical Name	CAS No.	Group No.
No data.		Group 1
No data.		Group 2A
No data.		Group 2B

12. ECOLOGICAL INFORMATION

Overview: Moderate ecological hazard. This product may be dangerous

to plants and/or wildlife.

Mobility: No data
Persistence: No data
Bioaccumulation: No data
Degradability: Biodegrades slowly.
Ecological Toxicity Data: No data available.

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product: Spent or discarded material is a hazardous waste.
Disposal Methods: Dispose of by incineration following Federal, State, Local, or Provincial regulations.
Waste Disposal of Packaging: Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:
DOT Proper Shipping Name: Methanol
UN Number: UN1230
Hazard Class: 3
Packing Group: II

International:
IATA Proper Shipping Name: Methanol
UN Number: UN1230
Hazard Class: 3 (6.1)
Packing Group: II

Marine Pollutant: No

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
methanol	67-56-1	X	X	-	X
aldrin	309-00-2	X	X	X	-

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Aldrin	309-00-2	Prop 65 Cancer
Methanol	67-56-1	Prop 65 Devolop Tox

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
methanol	67-56-1	X	X	X	X
aldrin	309-00-2	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 03/23/11
Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding prodcuts described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

SAFETY DATA SHEET

Version 5.8
Revision Date 06/02/2016
Print Date 08/02/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : α-BHC

Product Number : 48493
Brand : Supelco
Index-No. : 602-042-00-0

CAS-No. : 319-84-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Dermal (Category 4), H312
Carcinogenicity (Category 2), H351
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H301 Toxic if swallowed.
H312 Harmful in contact with skin.
H351 Suspected of causing cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.

P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P281	Use personal protective equipment as required.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P302 + P352 + P312	IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or doctor/ physician if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P363	Wash contaminated clothing before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : α-1,2,3,4,5,6-Hexachlorocyclohexane

Formula : C6H6Cl6
Molecular weight : 290.83 g/mol
CAS-No. : 319-84-6
EC-No. : 206-270-8
Index-No. : 602-042-00-0

Hazardous components

Component	Classification	Concentration
(1α,2α,3β,4α,5β,6β)-1,2,3,4,5,6-Hexachlorocyclohexane		
	Acute Tox. 3; Acute Tox. 4; Carc. 2; Aquatic Acute 1; Aquatic Chronic 1; H301, H312, H351, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	156.0 - 161.0 °C (312.8 - 321.8 °F)
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 3.80
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 177.0 mg/kg

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans ((1α,2α,3β,4α,5β,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)
IARC:	2B - Group 2B: Possibly carcinogenic to humans ((1α,2α,3β,4α,5β,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	Reasonably anticipated to be a human carcinogen ((1α,2α,3β,4α,5β,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)
NTP:	Reasonably anticipated to be a human carcinogen ((1α,2α,3β,4α,5β,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: GV3500000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Carassius auratus (goldfish) - 0.12 mg/l - 48.0 h
	LC50 - Cyprinus carpio (Carp) - 0.2 mg/l - 48.0 h
	LC50 - other fish - 1.49 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.20 - 1.70 mg/l - 48 h
Toxicity to algae	EC50 - No information available. - > 100.00 mg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Bioaccumulation: other fish - 96 h
- 0.8 mg/l

Bioconcentration factor (BCF): 250

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. ((1α,2α,3β,4α,5β,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)
Reportable Quantity (RQ): 10 lbs
Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG
UN number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. ((1α,2α,3β,4α,5β,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)

IATA
UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. ((1α,2α,3β,4α,5β,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
(1α,2α,3β,4α,5β,6β)-1,2,3,4,5,6-Hexachlorocyclohexane	319-84-6	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
(1α,2α,3β,4α,5β,6β)-1,2,3,4,5,6-Hexachlorocyclohexane	319-84-6	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
(1α,2α,3β,4α,5β,6β)-1,2,3,4,5,6-Hexachlorocyclohexane	319-84-6	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
(1α,2α,3β,4α,5β,6β)-1,2,3,4,5,6-Hexachlorocyclohexane	319-84-6	2007-07-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. (1α,2α,3β,4α,5β,6β)-1,2,3,4,5,6-Hexachlorocyclohexane	319-84-6	2009-02-01
WARNING! This product contains a chemical known to the State of California to cause cancer. (1α,2α,3β,4α,5β,6β)-1,2,3,4,5,6-Hexachlorocyclohexane	319-84-6	2009-02-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity

Carc.	Carcinogenicity
H301	Toxic if swallowed.
H312	Harmful in contact with skin.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0
Health hazard:	1
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.8 Revision Date: 06/02/2016 Print Date: 08/02/2019

SAFETY DATA SHEET

Version 4.8
Revision Date 05/03/2017
Print Date 07/13/2017

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : α-Chlordane

Product Number : 442449
Brand : Supelco

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 4), H332
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Carcinogenicity (Category 2), H351
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)

H302 + H332	Harmful if swallowed or if inhaled
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H351	Suspected of causing cancer.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.

P202	Do not handle until all safety precautions have been read and understood.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Molecular weight : 409.8 g/mol
EC-No. : 225-825-5

Hazardous components

Component	Classification	Concentration
Chlordane		
	Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; Carc. 2; STOT SE 3; Aquatic Acute 1; Aquatic Chronic 1; H302 + H332, H315, H319, H335, H351, H410	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.
Hazardous components without workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator.For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: crystalline Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	93.0 - 94.0 °C (199.4 - 201.2 °F)
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available

i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 500 mg/kg

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Chlordane)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Lepomis macrochirus (Bluegill) - 0.0074 mg/l - 96 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 24 h - 0.005 mg/l
	Bioconcentration factor (BCF): 322

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Chlordane)
Reportable Quantity (RQ): Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Chlordane)
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Chlordane)

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Chlordane	5103-71-9	

	CAS-No.	Revision Date
Chlordane	5103-71-9	

New Jersey Right To Know Components

	CAS-No.	Revision Date
Chlordane	5103-71-9	

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
H302	Harmful if swallowed.
H302 + H332	Harmful if swallowed or if inhaled
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H335	May cause respiratory irritation.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.8 Revision Date: 05/03/2017 Print Date: 07/13/2017

SAFETY DATA SHEET
Aluminum (pieces)

1. Identification

Product identifier

Product name Aluminum (pieces)

Internal identification Replaces M-1000-010

CAS number 7429-90-5

Recommended use of the chemical and restrictions on use

Application Exterior surface coating.

Uses advised against No specific uses advised against are identified.

Details of the supplier of the safety data sheet

Supplier Kurt J Lesker Company

Manufacturer Kurt J Lesker Company
1925 Route 51
Jefferson Hills, PA 15025
+1 412-387-9200

Kurt J Lesker Company LTD
United Kingdom
15-16 Burgess Road
Hastings, East Sussex, TN35 4NR
England
Customer Service: +44 (0) 1424 458100
msds@lesker.com

Emergency telephone number

Emergency telephone North America [USA, Canada, Mexico]: 1-866-519-4752
Mainland China: (+86) 4001 2001 74
Europe: {int'l call prefix}-1-760-476-3961
Asia Pacific: {int'l call prefix}-1-760-476-3960
Middle East & Africa: {int'l call prefix}-1-760-476-3959

2. Hazard(s) identification

Classification of the substance or mixture

Physical hazards Not Classified

Health hazards Not Classified

Environmental hazards Not Classified

Label elements

Hazard statements NC Not Classified

Other hazards

Aluminum (pieces)

This product does not contain any substances classified as PBT or vPvB. Based on available knowledge of this material, it has been determined to be non-hazardous and will not pose a risk to persons or the environment in its provided form. However, any cutting, welding, melting, grinding, or use for deposition will produce dust, fume, or particulates containing component elements of this material. Exposure to these components may present significant health hazards. Note: Fine particulate may be a combustible dust which, when dispersed in air, may present an explosion hazard.

3. Composition/information on ingredients

Mixtures

Aluminum (pieces) CAS number: 7429-90-5	**0 - 100%**

Classification
Not Classified

The full text for all hazard statements is displayed in Section 16.

4. First-aid measures

Description of first aid measures

General information If in doubt, get medical attention promptly. Show this Safety Data Sheet to the medical personnel.

Inhalation Move affected person to fresh air and keep warm and at rest in a position comfortable for breathing. Loosen tight clothing such as collar, tie or belt. Get medical attention if symptoms are severe or persist.

Ingestion Rinse mouth thoroughly with water. Get medical advice/attention if you feel unwell. Do not induce vomiting unless under the direction of medical personnel.

Skin Contact Rinse with water.

Eye contact Rinse with water. Get medical attention if any discomfort continues.

Protection of first aiders First aid personnel should wear appropriate protective equipment during any rescue.

Most important symptoms and effects, both acute and delayed

General information The severity of the symptoms described will vary dependent on the concentration and the length of exposure.

Inhalation No specific symptoms known.

Ingestion No specific symptoms known.

Skin contact Prolonged contact may cause dryness of the skin.

Eye contact No specific symptoms known. May be slightly irritating to eyes.

Indication of immediate medical attention and special treatment needed

Notes for the doctor Treat symptomatically.

5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media The product is flammable. Extinguish with alcohol-resistant foam, carbon dioxide or dry powder. Use fire-extinguishing media suitable for the surrounding fire.

Unsuitable extinguishing media Do not use water, if avoidable.

Aluminum (pieces)

Special hazards arising from the substance or mixture

Specific hazards Reacts with water. Flammable solid. Dust may form explosive mixture with air. Fire-water run-off in sewers may create fire or explosion hazard.

Hazardous combustion products Thermal decomposition or combustion products may include the following substances: Harmful gases or vapors.

Advice for firefighters

Protective actions during firefighting Avoid breathing fire gases or vapors. Evacuate area. Control run-off water by containing and keeping it out of sewers and watercourses. If risk of water pollution occurs, notify appropriate authorities.

Special protective equipment for firefighters Wear positive-pressure self-contained breathing apparatus (SCBA) and appropriate protective clothing. Standard Firefighter's clothing including helmets, protective boots and gloves will provide a basic level of protection for chemical incidents.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Personal precautions Wear protective clothing as described in Section 8 of this safety data sheet. No action shall be taken without appropriate training or involving any personal risk. Evacuate area. Provide adequate ventilation. No smoking, sparks, flames or other sources of ignition near spillage. Promptly remove any clothing that becomes contaminated.

Environmental precautions

Environmental precautions Avoid discharge into drains or watercourses or onto the ground.

Methods and material for containment and cleaning up

Methods for cleaning up Wear protective clothing as described in Section 8 of this safety data sheet. Clear up spills immediately and dispose of waste safely. Eliminate all ignition sources if safe to do so. No smoking, sparks, flames or other sources of ignition near spillage. Do not allow material to enter confined spaces, due to the risk of explosion. Collect spillage with a shovel and broom, or similar and reuse, if possible. Collect and place in suitable waste disposal containers and seal securely. Flush contaminated area with plenty of water. Wash thoroughly after dealing with a spillage. For waste disposal, see Section 13.

Reference to other sections For personal protection, see Section 8. See Section 11 for additional information on health hazards. See Section 12 for additional information on ecological hazards. For waste disposal, see Section 13.

7. Handling and storage

Precautions for safe handling

Usage precautions Read and follow manufacturer's recommendations. Wear protective clothing as described in Section 8 of this safety data sheet. Keep away from food, drink and animal feeding stuffs. Keep container tightly sealed when not in use. The product is flammable. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Do not handle until all safety precautions have been read and understood. Do not handle broken packages without protective equipment. Do not reuse empty containers.

Advice on general occupational hygiene Wash promptly if skin becomes contaminated. Take off contaminated clothing and wash before reuse. Wash contaminated clothing before reuse.

Conditions for safe storage, including any incompatibilities

Storage precautions Keep away from oxidizing materials, heat and flames. Avoid contact with water. Keep only in the original container. Keep container tightly closed, in a cool, well ventilated place. Keep containers upright. Protect containers from damage.

Aluminum (pieces)

Storage class Water-reactive storage.

Specific end uses(s)

Specific end use(s) The identified uses for this product are detailed in Section 1.

8. Exposure Controls/personal protection

Control parameters

Occupational exposure limits

Aluminum (pieces)

Long-term exposure limit (8-hour TWA): OSHA 5 mg/m³ respirable fraction
as Al
Long-term exposure limit (8-hour TWA): OSHA 15 mg/m³ total dust
as Al
Long-term exposure limit (8-hour TWA): ACGIH 1 mg/m³ respirable fraction
A4
OSHA = Occupational Safety and Health Administration.
ACGIH = American Conference of Governmental Industrial Hygienists.
A4 = Not Classifiable as a Human Carcinogen.

Exposure controls

Protective equipment



Appropriate engineering controls Provide adequate ventilation. Observe any occupational exposure limits for the product or ingredients.

Eye/face protection Unless the assessment indicates a higher degree of protection is required, the following protection should be worn: Tight-fitting safety glasses.

Hand protection No specific hand protection recommended.

Other skin and body protection Wear appropriate clothing to prevent repeated or prolonged skin contact.

Hygiene measures Wash hands thoroughly after handling. Wash at the end of each work shift and before eating, smoking and using the toilet. Do not eat, drink or smoke when using this product.

Respiratory protection Ensure all respiratory protective equipment is suitable for its intended use and is NIOSH approved. Check that the respirator fits tightly and the filter is changed regularly. Gas and combination filter cartridges should comply with OSHA 1910.134. Full face mask respirators with replaceable filter cartridges should comply with OSHA 1910.134. Half mask and quarter mask respirators with replaceable filter cartridges should comply with OSHA 1910.134.

Environmental exposure controls Keep container tightly sealed when not in use.

9. Physical and Chemical Properties

Information on basic physical and chemical properties

Appearance Solid.

Color Silver.

Odor No characteristic odor.

Odor threshold Not applicable.

Aluminum (pieces)

pH	Not applicable.
Melting point	660°C
Initial boiling point and range	Not available.
Flash point	Not applicable.
Evaporation rate	Not applicable.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	Not applicable.
Vapor pressure	Not available.
Vapor density	Not available.
Relative density	2.70 @ 25°C
Bulk density	Not available.
Solubility(ies)	Insoluble in water.
Partition coefficient	Not applicable.
Auto-ignition temperature	Not applicable.
Decomposition Temperature	Not available.
Viscosity	Not applicable.
Molecular weight	26.98

10. Stability and reactivity

Reactivity	There are no known reactivity hazards associated with this product.
Stability	Stable at normal ambient temperatures and when used as recommended. Stable under the prescribed storage conditions.
Possibility of hazardous reactions	Reacts strongly with water. The following materials may react strongly with the product: Oxidizing agents.
Conditions to avoid	Avoid heat, flames and other sources of ignition. Static electricity and formation of sparks must be prevented.
Materials to avoid	Water. Oxidizing materials. Acids - oxidizing.
Hazardous decomposition products	Does not decompose when used and stored as recommended. Thermal decomposition or combustion products may include the following substances: Harmful gases or vapors.

11. Toxicological information

Information on toxicological effects

Acute toxicity - oral

Notes (oral LD_{50}) Based on available data the classification criteria are not met.

Acute toxicity - dermal

Notes (dermal LD_{50}) Based on available data the classification criteria are not met.

Acute toxicity - inhalation

Aluminum (pieces)

Notes (inhalation LC_{50}) Based on available data the classification criteria are not met.

Skin corrosion/irritation

Animal data Based on available data the classification criteria are not met.

Serious eye damage/irritation

Serious eye damage/irritation Based on available data the classification criteria are not met.

Respiratory sensitization

Respiratory sensitization Based on available data the classification criteria are not met.

Skin sensitization

Skin sensitization Based on available data the classification criteria are not met.

Germ cell mutagenicity

Genotoxicity - in vitro Based on available data the classification criteria are not met.

Carcinogenicity

Carcinogenicity Based on available data the classification criteria are not met.

IARC carcinogenicity None of the ingredients are listed or exempt.

Reproductive toxicity

Reproductive toxicity - fertility Based on available data the classification criteria are not met.

Reproductive toxicity - development Based on available data the classification criteria are not met.

Specific target organ toxicity - single exposure

STOT - single exposure Not classified as a specific target organ toxicant after a single exposure.

Specific target organ toxicity - repeated exposure

STOT - repeated exposure Not classified as a specific target organ toxicant after repeated exposure.

Aspiration hazard

Aspiration hazard Not relevant. Solid.

General information The severity of the symptoms described will vary dependent on the concentration and the length of exposure.

Inhalation No specific symptoms known.

Ingestion No specific symptoms known.

Skin Contact Prolonged contact may cause dryness of the skin.

Eye contact No specific symptoms known.

Route of exposure Ingestion Inhalation Skin and/or eye contact

Target Organs No specific target organs known.

12. Ecological Information

Ecotoxicity Not regarded as dangerous for the environment. However, large or frequent spills may have hazardous effects on the environment.

Toxicity Based on available data the classification criteria are not met.

Persistence and degradability

Aluminum (pieces)

Persistence and degradability Reacts with water.

Bioaccumulative potential

Bio-Accumulative Potential No data available on bioaccumulation.

Partition coefficient Not applicable.

Mobility in soil

Mobility No data available.

Other adverse effects

Other adverse effects None known.

13. Disposal considerations

Waste treatment methods

General information The generation of waste should be minimized or avoided wherever possible. Reuse or recycle products wherever possible. This material and its container must be disposed of in a safe way. When handling waste, the safety precautions applying to handling of the product should be considered. Care should be taken when handling emptied containers that have not been thoroughly cleaned or rinsed out. Empty containers or liners may retain some product residues and hence be potentially hazardous.

Disposal methods Dispose of surplus products and those that cannot be recycled via a licensed waste disposal contractor. Waste, residues, empty containers, discarded work clothes and contaminated cleaning materials should be collected in designated containers, labeled with their contents. Incineration or landfill should only be considered when recycling is not feasible.

14. Transport information

General The product is not covered by international regulations on the transport of dangerous goods (IMDG, IATA, DOT).

UN Number

Not applicable.

UN proper shipping name

Not applicable.

Transport hazard class(es)

No transport warning sign required.

Transport labels

No transport warning sign required.

DOT transport labels

No transport warning sign required.

Packing group

Not applicable.

Environmental hazards

Environmentally Hazardous Substance

No.

Special precautions for user

Aluminum (pieces)

Based on available knowledge of this material, it has been determined to be non-hazardous and will not pose a risk to persons or the environment in its provided form. However, any cutting, welding, melting, grinding, or use for deposition will produce dust, fume, or particulates containing component elements of this material. Exposure to these components may present significant health hazards. Note: Fine particulate may be a combustible dust which, when dispersed in air, may present an explosion hazard.

DOT TIH Zone Not applicable.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

15. Regulatory information

US Federal Regulations

SARA Section 302 Extremely Hazardous Substances Tier II Threshold Planning Quantities
None of the ingredients are listed or exempt.

CERCLA/Superfund, Hazardous Substances/Reportable Quantities (EPA)
None of the ingredients are listed or exempt.

SARA Extremely Hazardous Substances EPCRA Reportable Quantities
None of the ingredients are listed or exempt.

SARA 313 Emission Reporting
None of the ingredients are listed or exempt.

CAA Accidental Release Prevention
None of the ingredients are listed or exempt.

FDA - Essential Chemical
None of the ingredients are listed or exempt.

FDA - Precursor Chemical
None of the ingredients are listed or exempt.

SARA (311/312) Hazard Categories
None of the ingredients are listed or exempt.

OSHA Highly Hazardous Chemicals
None of the ingredients are listed or exempt.

US State Regulations

California Proposition 65 Carcinogens and Reproductive Toxins
None of the ingredients are listed or exempt.

California Air Toxics "Hot Spots" (A-I)
None of the ingredients are listed or exempt.

California Air Toxics "Hot Spots" (A-II)
None of the ingredients are listed or exempt.

California Directors List of Hazardous Substances
None of the ingredients are listed or exempt.

Massachusetts "Right To Know" List
None of the ingredients are listed or exempt.

Aluminum (pieces)

Rhode Island "Right To Know" List
None of the ingredients are listed or exempt.

Minnesota "Right To Know" List
None of the ingredients are listed or exempt.

New Jersey "Right To Know" List
None of the ingredients are listed or exempt.

Pennsylvania "Right To Know" List
None of the ingredients are listed or exempt.

Inventories

US - TSCA
None of the ingredients are listed or exempt.

US - TSCA 12(b) Export Notification
None of the ingredients are listed or exempt.

16. Other information

Training advice	Only trained personnel should use this material.
Revision date	5/9/2018
Revision	7
Supersedes date	5/9/2018
SDS No.	4661

End of SDS

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is, to the best of the company's knowledge and belief, accurate and reliable as of the date indicated. However, no warranty, guarantee or representation is made to its accuracy, reliability or completeness. It is the user's responsibility to satisfy himself as to the suitability of such information for his own particular use.

SAFETY DATA SHEET

Version 4.9
Revision Date 04/20/2015
Print Date 12/11/2015

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Anthracene

Product Number : A89200
Brand : Aldrich

CAS-No. : 120-12-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.
P280 Wear eye protection/ face protection.

P280	Wear protective gloves.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Photosensitizer., Lachrymator.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_{14}H_{10}$
Molecular weight	:	178.23 g/mol
CAS-No.	:	120-12-7
EC-No.	:	204-371-1

Hazardous components

Component	Classification	Concentration
Anthracene Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)		
	Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; Aquatic Acute 1; Aquatic Chronic 1; H315, H319, H335, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Anthracene	120-12-7	TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Remarks	1910.1002 As used in §1910.1000 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter. Asphalt (CAS 8052-42-4, and CAS 64742-93-4) is not covered under the 'coal tar pitch volatiles' standard OSHA specifically regulated carcinogen		

		TWA	0.100000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products. cyclohexane-extractable fraction See Appendix C See Appendix A		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Anthracene	120-12-7	1-Hydroxypyrene (1-HP)		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Chloroprene
Minimum layer thickness: 0.6 mm
Break through time: 480 min
Material tested:Camapren® (KCL 722 / Aldrich Z677493, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 30 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator.For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: crystalline Colour: beige
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 210 - 215 °C (410 - 419 °F) - lit.
f)	Initial boiling point and boiling range	340 °C (644 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Lower explosion limit: 0.6 %(V)
k)	Vapour pressure	1.3 hPa (1.0 mmHg) at 145.0 °C (293.0 °F)
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 4.45
p)	Auto-ignition temperature	540.0 °C (1,004.0 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong oxidizing agents, Hypochlorites

10.6 Hazardous decomposition products

Other decomposition products - No data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
Inhalation: No data available

Dermal: No data available

LD50 Intraperitoneal - Mouse - 430 mg/kg

Skin corrosion/irritation
Skin - Mouse
Result: Mild skin irritation

Serious eye damage/eye irritation
Irritating to eyes. The preceding data, or interpretation of data, was determined using Quantitative Structure Activity Relationship (QSAR) modeling.

Respiratory or skin sensitisation
Causes photosensitivity. Exposure to light can result in allergic reactions resulting in dermatologic lesions, which can vary from sunburnlike responses to edematous, vesiculated lesions, or bullae

Germ cell mutagenicity
No data available

Carcinogenicity

IARC:	3 - Group 3: Not classifiable as to its carcinogenicity to humans (Anthracene)
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	OSHA specifically regulated carcinogen (Anthracene)

Reproductive toxicity

No data available

Specific target organ toxicity - single exposure
Inhalation - May cause respiratory irritation.
The preceding data, or interpretation of data, was determined using Quantitative Structure Activity Relationship (QSAR) modeling.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: CA9350000

Possible tumor promoter., Headache, Nausea, Weakness

Blood -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Lepomis macrochirus (Bluegill) - 0.001 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.10 mg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Indication of bioaccumulation.
Bioaccumulation Pimephales promelas (fathead minnow) - 42 d
- 0.01191 mg/l

Bioconcentration factor (BCF): 649

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Anthracene)
Reportable Quantity (RQ): 5000 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Anthracene)
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Anthracene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Anthracene	120-12-7	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Anthracene	120-12-7	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Anthracene	120-12-7	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Anthracene	120-12-7	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Anthracene	120-12-7	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Eye Irrit.	Eye irritation
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.9 Revision Date: 04/20/2015 Print Date: 12/11/2015

Antimony

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Revision Date: 02/12/2014 Version: 1.0

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY

1.1. Product Identifier

Product Form: Substance

Product Name: Antimony

Synonyms: Stibium (Sb)

1.2. Intended Use of the Product No additional information available

1.3. Name, Address, and Telephone of the Responsible Party

Company

Atomized Products Group, Inc
3838 Miller Park Dr
Garland, TX 75042
T 972-272-9596
atomizedproductsgroup.com

1.4. Emergency Telephone Number

Emergency Number : 800-255-3924 (CHEMTEL)

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the Substance or Mixture

Classification (GHS-US)

Comb. Dust
Acute Tox. 3 (Oral) H301
Acute Tox. 4 (Inhalation:dust,mist) H332
Carc. 2 H351
Aquatic Acute 2 H401
Aquatic Chronic 2 H411

2.2. Label Elements

GHS-US Labeling

Hazard Pictograms (GHS-US) :



GHS06 GHS07 GHS08 GHS09

Signal Word (GHS-US) : Danger

Hazard Statements (GHS-US) : May form combustible dust concentrations in air
H301 - Toxic if swallowed
H332 - Harmful if inhaled
H351 - Suspected of causing cancer
H401 - Toxic to aquatic life
H411 - Toxic to aquatic life with long lasting effects

Precautionary Statements (GHS-US) : P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.
P261 - Avoid breathing dust.
P264 - Wash hands, forearms, and other exposed areas thoroughly after handling.
P270 - Do not eat, drink or smoke when using this product.
P271 - Use only outdoors or in a well-ventilated area.
P273 - Avoid release to the environment.
P280 - Wear protective gloves, protective clothing, eye protection, face protection, respiratory protection.
P301+P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P304+P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P308+P313 - If exposed or concerned: Get medical advice/attention.

P312 - Call a POISON CENTER/doctor/physician if you feel unwell.
P321 - Specific treatment (see section 4).
P330 - If swallowed, rinse mouth.
P391 - Collect spillage.
P405 - Store locked up.
P501 - Dispose of contents/container to local, regional, national, territorial, provincial, and international regulations.

2.3. Other Hazards

Other Hazards Not Contributing to the Classification: Exposure may aggravate those with pre-existing eye, skin, or respiratory conditions. May form combustible dust concentrations in air. Exposure may aggravate individuals with pre-existing skin, kidney, liver, and pulmonary disorders. On burning release of harmful/irritant gases/vapours (antimony oxides). Inhalation of dusts and fumes can cause metal fume fever. Symptoms can include a metallic or sweet taste in the mouth, sweating, shivering, headache, throat irritation, fever, chills, thirstiness, muscle aches, nausea, vomiting, weakness, fatigue, and shortness of breath.

2.4. Unknown Acute Toxicity (GHS-US)

No data available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substance

Name : Antimony

Name	Product identifier	%	Classification (GHS-US)
Antimony	(CAS No) 7440-36-0	100	Comb. Dust Acute Tox. 3 (Oral), H301 Acute Tox. 4 (Inhalation), H332 Carc. 2, H351 Aquatic Acute 2, H401 Aquatic Chronic 2, H411

Full text of H-phrases: see section 16

3.2. Mixture

Not applicable

SECTION 4: FIRST AID MEASURES

4.1. Description of First Aid Measures

First-aid Measures General: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).

First-aid Measures After Inhalation: When symptoms occur: go into open air and ventilate suspected area. Obtain medical attention if breathing difficulty persists.

First-aid Measures After Skin Contact: Remove contaminated clothing. Drench affected area with water for at least 15 minutes. Obtain medical attention if irritation persists.

First-aid Measures After Eye Contact: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical attention if irritation persists.

First-aid Measures After Ingestion: Rinse mouth. Do not induce vomiting. Seek medical attention if a large amount is swallowed.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/Injuries: Suspected of causing cancer. Toxic if swallowed. Harmful if inhaled.

Symptoms/Injuries After Inhalation: Harmful if inhaled. Respiratory tract irritation.

Symptoms/Injuries After Skin Contact: Prolonged contact with large amounts of dust may cause mechanical irritation.

Symptoms/Injuries After Eye Contact: Prolonged contact with large amounts of dust may cause mechanical irritation.

Symptoms/Injuries After Ingestion: Toxic if swallowed. May cause nausea, vomiting, and diarrhea.

Chronic Symptoms: Prolonged exposure may cause effects in specific organs such as the liver, kidneys, blood, and nervous system.

4.3. Indication of Any Immediate Medical Attention and Special Treatment Needed

If exposed or concerned, get medical advice and attention.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing Media

Suitable Extinguishing Media: Use extinguishing media appropriate for surrounding fire.

Unsuitable Extinguishing Media: Do not use a heavy water stream. Use of heavy stream of water may spread fire.

5.2. Special Hazards Arising From the Substance or Mixture

Fire Hazard: Not considered flammable but may burn at high temperatures. Dust explosion hazard in air.

Explosion Hazard: Avoid dust clouds in combination with static electricity. Dust explosion hazard in air.

Reactivity: Hazardous reactions will not occur under normal conditions. Dust clouds can be explosive.

5.3. Advice for Firefighters

Precautionary Measures Fire: Exercise caution when fighting any chemical fire.

Firefighting Instructions: Use water spray or fog for cooling exposed containers. In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.

Protection During Firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.

Other information: Risk of dust explosion. Do not allow the product to be released into the environment. Do not allow run-off from fire fighting to enter drains or water courses.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal Precautions, Protective Equipment and Emergency Procedures

General Measures: Use special care to avoid static electric charges. Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Handle in accordance with good industrial hygiene and safety practice. Do not breathe dust. Avoid generating dust. Avoid all contact with skin, eyes, or clothing.

6.1.1. For Non-emergency Personnel

Protective Equipment: Use appropriate personal protection equipment (PPE).

Emergency Procedures: Evacuate unnecessary personnel.

6.1.2. For Emergency Responders

Protective Equipment: Equip cleanup crew with proper protection. Use appropriate personal protection equipment (PPE).

Emergency Procedures: Ventilate area.

6.2. Environmental Precautions

Prevent entry to sewers and public waters. Do not allow to enter drains or water courses.

6.3. Methods and Material for Containment and Cleaning Up

For Containment: Avoid generation of dust during clean-up of spills. Use only non-sparking tools.

Methods for Cleaning Up: Clear up spills immediately and dispose of waste safely. Avoid generation of dust during clean-up of spills. Use only non-sparking tools. Use explosion proof vacuum during cleanup, with appropriate filter, do not mix with other materials. Contact competent authorities after a spill.

6.4. Reference to Other Sections

See heading 8, Exposure Controls and Personal Protection.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for Safe Handling

Additional Hazards When Processed: Avoid dust production. Accumulation and dispersion of dust with an ignition source can cause a combustible dust explosion, keep dust levels to a minimum and follow applicable regulations. Do not pressurize, cut, or weld containers. . On burning: release of harmful/irritant gases/vapours e.g.: (antimony oxides).

Precautions for Safe Handling: Use only non-sparking tools. Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Handle in accordance with good industrial hygiene and safety procedures.

Hygiene Measures: Handle in accordance with good industrial hygiene and safety procedures. Wash hands and other exposed areas with mild soap and water before eating, drinking, or smoking and again when leaving work. Do no eat, drink or smoke when using this product.

7.2. Conditions for Safe Storage, Including Any Incompatibilities

Technical Measures: Proper grounding procedures to avoid static electricity should be followed. Ground/bond container and receiving equipment. Use explosion-proof electrical, ventilating, and lighting equipment. Comply with applicable regulations.

Storage Conditions: Store in a dry, cool and well-ventilated place. Keep container closed when not in use. Keep/Store away from extremely high or low temperatures, ignition sources, incompatible materials.

Incompatible Products: Strong acids. Strong bases. Strong oxidizers.

7.3. Specific End Use(s)

No additional information available

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control Parameters

Antimony (7440-36-0)		
USA ACGIH	ACGIH TWA (mg/m³)	0.5 mg/m³
USA NIOSH	NIOSH REL (TWA) (mg/m³)	0.5 mg/m³

USA IDLH	US IDLH (mg/m³)	50 mg/m³
USA OSHA	OSHA PEL (TWA) (mg/m³)	0.5 mg/m³

8.2. Exposure Controls

Appropriate Engineering Controls : Ensure all national/local regulations are observed. Proper grounding procedures to avoid static electricity should be followed. Use explosion-proof equipment. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment : Gloves. Protective goggles. Respiratory protection of the dependent type. Protective clothing.



Materials for Protective Clothing : Chemically resistant materials and fabrics.

Hand Protection : Wear chemically resistant protective gloves.

Eye Protection : Chemical goggles or safety glasses.

Skin and Body Protection : Wear suitable protective clothing.

Respiratory Protection : Use NIOSH-approved air-purifying or supplied-air respirator where airborne concentrations of dust are expected to exceed exposure limits.

Thermal Hazard Protection : Wear suitable protective clothing.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on Basic Physical and Chemical Properties

Physical State : Solid

Odor : No data available

Odor Threshold : No data available

pH : No data available

Relative Evaporation Rate (butylacetate=1) : No data available

Melting Point : No data available

Freezing Point : No data available

Boiling Point : No data available

Flash Point : No data available

Auto-ignition Temperature : No data available

Decomposition Temperature : No data available

Flammability (solid, gas) : No data available

Vapor Pressure : No data available

Relative Vapor Density at 20 °C : No data available

Relative Density : No data available

Specific Gravity : No data available

Solubility : No data available

Log Pow : No data available

Log Kow : No data available

Viscosity, Kinematic : No data available

Viscosity, Dynamic : No data available

Explosive Properties : No data available

Oxidizing Properties : No data available

Explosive Limits : No data available

9.2. Other Information No additional information available

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity: Hazardous reactions will not occur under normal conditions. Dust clouds can be explosive.

10.2 Chemical Stability: Dust clouds can be explosive.

10.3 Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

10.4 Conditions to Avoid: Direct sunlight. Extremely high or low temperatures. Open flame. Ignition sources. Incompatible materials.

10.5 Incompatible Materials: Strong acids. Strong bases. Strong oxidizers. Halogenated compounds.

10.6 Hazardous Decomposition Products: Antimony and its oxides. Metal oxides. Inhalation of fumes may cause metal fume fever.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information On Toxicological Effects

Acute Toxicity: Toxic if swallowed. Harmful if inhaled.

Antimony	
ATE (Oral)	500.000 mg/kg body weight
ATE (Dust/Mist)	1.500 mg/l/4h

Antimony (7440-36-0)	
LD50 Oral Rat	100 mg/kg
ATE (Oral)	100.000 mg/kg body weight

Skin Corrosion/Irritation: Not classified

Serious Eye Damage/Irritation: Not classified

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Carcinogenicity: Suspected of causing cancer.

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Single Exposure): Not classified

Specific Target Organ Toxicity (Repeated Exposure): Not classified

Aspiration Hazard: Not classified

Symptoms/Injuries After Inhalation: Harmful if inhaled. Respiratory tract irritation.

Symptoms/Injuries After Skin Contact: Prolonged contact with large amounts of dust may cause mechanical irritation.

Symptoms/Injuries After Eye Contact: Prolonged contact with large amounts of dust may cause mechanical irritation.

Symptoms/Injuries After Ingestion: Toxic if swallowed. May cause nausea, vomiting, and diarrhea.

Chronic Symptoms: Prolonged exposure may cause effects in specific organs such as the liver, kidneys, blood, and nervous system.

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Ecology - General : Toxic to aquatic life with long lasting effects.

12.2. Persistence and Degradability

Antimony	
Persistence and Degradability	May cause long-term adverse effects in the environment.

12.3. Bioaccumulative Potential No additional information available

12.4. Mobility in Soil No additional information available

12.5. Other Adverse Effects

Other Information : Avoid release to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste Disposal Recommendations: Dispose of waste material in accordance with all local, regional, national, and international regulations.

Additional Information: The materials contained within this product are hazardous to the environment, do not release into the environment.

SECTION 14: TRANSPORT INFORMATION

14.1 In Accordance with DOT

Proper Shipping Name : ANTIMONY POWDER
Hazard Class : 6.1
Identification Number : UN2871
Label Codes : 6.1
Packing Group : III
Marine Pollutant : Marine pollutant
ERG Number : 170



14.2 In Accordance with IMDG

Proper Shipping Name : ANTIMONY POWDER
Hazard Class : 6.1
Identification Number : UN2871
Packing Group : III
Label Codes : 6.1
EmS-No. (Fire) : F-A
EmS-No. (Spillage) : S-A
MFAG Number : 171



14.3 In Accordance with IATA

Proper Shipping Name : ANTIMONY POWDER
Packing Group : III
Identification Number : UN2871
Hazard Class : 6
Label Codes : 6.1
ERG Code (IATA) : 6L



SECTION 15: REGULATORY INFORMATION

15.1 US Federal Regulations

Antimony	
SARA Section 311/312 Hazard Classes	Delayed (chronic) health hazard Immediate (acute) health hazard

Antimony (7440-36-0)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on SARA Section 313 (Specific toxic chemical listings)	
SARA Section 313 - Emission Reporting	1.0 %

15.2 US State Regulations

Antimony (7440-36-0)
U.S. - California - Priority Toxic Pollutants - Human Health Criteria
U.S. - California - Toxic Air Contaminant List (AB 1807, AB 2728)
U.S. - Colorado - Primary Drinking Water Regulations - Maximum Contaminant Level Goals (MCLGs)
U.S. - Colorado - Primary Drinking Water Regulations - Maximum Contaminant Levels (MCLs)
U.S. - Connecticut - Drinking Water Quality Standards - Maximum Contaminant Levels
U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)
U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)
U.S. - Connecticut - Water Quality Standards - Consumption of Organisms Only
U.S. - Connecticut - Water Quality Standards - Consumption of Water and Organisms
U.S. - Connecticut - Water Quality Standards - Health Designations
U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities
U.S. - Florida - Drinking Water Standards - Inorganic Contaminants - Maximum Contaminant Levels (MCLs)
U.S. - Georgia - Drinking Water - Maximum Contaminant Levels (MCLs)
U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Acceptable Ambient Concentrations
U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Emission Levels (ELs)
U.S. - Idaho - Occupational Exposure Limits - TWAs

U.S. - Illinois - Toxic Air Contaminants
U.S. - Louisiana - Reportable Quantity List for Pollutants
U.S. - Maine - Air Pollutants - Hazardous Air Pollutants
U.S. - Maryland - Surface Water Quality Standards - Consumption of Organisms Only
U.S. - Maryland - Surface Water Quality Standards - Consumption of Water and Organisms
U.S. - Massachusetts - Allowable Ambient Limits (AALs)
U.S. - Massachusetts - Allowable Threshold Concentrations (ATCs)
U.S. - Massachusetts - Drinking Water - Maximum Contaminant Levels (MCLs)
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Right To Know List
U.S. - Massachusetts - Threshold Effects Exposure Limits (TELs)
U.S. - Massachusetts - Toxics Use Reduction Act
U.S. - Michigan - Occupational Exposure Limits - TWAs
U.S. - Michigan - Polluting Materials List
U.S. - Minnesota - Chemicals of High Concern
U.S. - Minnesota - Groundwater Health Risk Limits
U.S. - Minnesota - Hazardous Substance List
U.S. - Minnesota - Permissible Exposure Limits - TWAs
U.S. - Missouri - Drinking Water - Maximum Contaminant Levels (MCLs)
U.S. - Nebraska - Drinking Water - Maximum Contaminant Levels (MCLs)
U.S. - New Hampshire - Drinking Water - Maximum Contaminant Levels (MCLs)
U.S. - New Hampshire - Regulated Toxic Air Pollutants - Ambient Air Levels (AALs) - 24-Hour
U.S. - New Hampshire - Regulated Toxic Air Pollutants - Ambient Air Levels (AALs) - Annual
U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
U.S. - New Jersey - Environmental Hazardous Substances List
U.S. - New Jersey - Primary Drinking Water Standards - Maximum Contaminant Levels - MCLs
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - New Jersey - Water Quality - Ground Water Quality Criteria
U.S. - New Jersey - Water Quality - Practical Quantitation Levels (PQLs)
U.S. - New York - Occupational Exposure Limits - TWAs
U.S. - New York - Reporting of Releases Part 597 - List of Hazardous Substances
U.S. - North Dakota - Air Pollutants - Guideline Concentrations - 8-Hour
U.S. - North Dakota - Water Quality Standards - Human Health Value for Class III
U.S. - North Dakota - Water Quality Standards - Human Health Value for Classes I, IA, II
U.S. - Oregon - Permissible Exposure Limits - TWAs
U.S. - Pennsylvania - Drinking Water - Maximum Contaminant Levels (MCLs)
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - Rhode Island - Air Toxics - Acceptable Ambient Levels - 24-Hour
U.S. - Rhode Island - Water Quality Standards - Acute Freshwater Aquatic Life Criteria
U.S. - Rhode Island - Water Quality Standards - Chronic Freshwater Aquatic Life Criteria
U.S. - Rhode Island - Water Quality Standards - Human Health Criteria for Consumption of Aquatic Organisms Only
U.S. - Rhode Island - Water Quality Standards - Human Health Criteria for Consumption of Water and Aquatic Organisms
U.S. - South Carolina - Maximum Contaminant Levels (MCLs)
U.S. - Tennessee - Occupational Exposure Limits - TWAs
U.S. - Texas - Drinking Water Standards - Maximum Contaminant Levels (MCLs)
U.S. - Texas - Effects Screening Levels - Long Term
U.S. - Texas - Effects Screening Levels - Short Term
U.S. - Utah - Drinking Water - Maximum Contaminant Levels (MCLs)
U.S. - Vermont - Hazardous Waste - Hazardous Constituents
U.S. - Vermont - Permissible Exposure Limits - TWAs
U.S. - Virginia - Water Quality Standards - Public Water Supply Effluent Limits
U.S. - Virginia - Water Quality Standards - Surface Waters Not Used for the Public Water Supply Effluent Limits

U.S. - Washington - Dangerous Waste - Dangerous Waste Constituents List
U.S. - Washington - Permissible Exposure Limits - STELs
U.S. - Washington - Permissible Exposure Limits - TWAs
U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights 25 Feet to Less Than 40 Feet
U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights 40 Feet to Less Than 75 Feet
U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights 75 Feet or Greater
U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights Less Than 25 Feet

SECTION 16: OTHER INFORMATION

Revision date : 02/12/2014

Other Information : This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200.

GHS Full Text Phrases:

Acute Tox. 3 (Oral)	Acute toxicity (oral) Category 3
Acute Tox. 4 (Inhalation)	Acute toxicity (inhalation) Category 4
Acute Tox. 4 (Inhalation:dust,mist)	Acute toxicity (inhalation:dust,mist) Category 4
Aquatic Acute 2	Hazardous to the aquatic environment - Acute Hazard Category 2
Aquatic Chronic 2	Hazardous to the aquatic environment - Chronic Hazard Category 2
Carc. 2	Carcinogenicity Category 2
Comb. Dust	Combustible Dust
	May form combustible dust concentrations in air
H301	Toxic if swallowed
H332	Harmful if inhaled
H351	Suspected of causing cancer
H401	Toxic to aquatic life
H411	Toxic to aquatic life with long lasting effects

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

SDS US (GHS HazCom) - US

SAFETY DATA SHEET

Version 5.2
Revision Date 02/27/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Aroclor 1254

Product Number : 48586
Brand : Supelco
Index-No. : 602-039-00-4

CAS-No. : 11097-69-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Specific target organ toxicity - repeated exposure (Category 2), H373
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H302 Harmful if swallowed.
H373 May cause damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P273 Avoid release to the environment.
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.

P314	Get medical advice/ attention if you feel unwell.
P391	Collect spillage.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

CAS-No. : 11097-69-1
Index-No. : 602-039-00-4

Hazardous components

Component	Classification	Concentration
Aroclor 1254		
	Acute Tox. 4; STOT RE 2; Aquatic Acute 1; Aquatic Chronic 1; H302, H373, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Nature of decomposition products not known.

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Non Combustible Liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Aroclor 1254	11097-69-1	TWA	0.5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Remarks	Skin designation		
		TWA	0.500000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		TWA	0.5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Liver damage Chloracne Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	0.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Liver damage Chloracne Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	0.5 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation		
		TWA	0.001000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition	No data available

temperature

r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 1,010 mg/kg

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Rat
Liver
Unscheduled DNA synthesis

Rat
Liver
DNA damage

Mouse
fibroblast
Morphological transformation.

Rat
Morphological transformation.

Rat
DNA damage

Rat
DNA damage

Carcinogenicity

Carcinogenicity - Rat - Oral
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Gastrointestinal:Tumors.

Carcinogenicity - Rat - Oral
Tumorigenic:Carcinogenic by RTECS criteria. Liver:Tumors.

Carcinogenicity - Mouse - Skin
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Skin and Appendages: Other: Tumors.
Tumorigenic:Tumors at site or application.

Carcinogenicity - Rat - Oral
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Gastrointestinal:Tumors.

Carcinogenicity - Mouse - Oral
Tumorigenic:Neoplastic by RTECS criteria. Liver:Tumors.

Carcinogenicity - Mouse - Intraperitoneal
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Tumorigenic Effects: Uterine tumors. Lungs, Thorax, or Respiration:Tumors.

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

Reproductive toxicity - Rabbit - Oral
Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).
Effects on Fertility: Abortion. Effects on Embryo or Fetus: Fetal death.

Reproductive toxicity - Rabbit - Oral
Effects on Newborn: Biochemical and metabolic.

Reproductive toxicity - Rat - Oral
Effects on Newborn: Biochemical and metabolic.

Reproductive toxicity - Rat - Oral
Effects on Newborn: Behavioral.

Reproductive toxicity - Rat - Oral
Effects on Newborn: Delayed effects.

Reproductive toxicity - Rat - Intraperitoneal
Maternal Effects: Other effects. Effects on Newborn: Biochemical and metabolic.

Reproductive toxicity - Mouse - Oral
Effects on Newborn: Behavioral.

Reproductive toxicity - Mammal - Oral
Effects on Fertility: Female fertility index (e.g., # females pregnant per # sperm positive females; # females pregnant per # females mated).

No data available

Developmental Toxicity - Rat - Oral

Specific Developmental Abnormalities: Hepatobiliary system.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
May cause damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.22 µg/l - 96.0 h
Toxicity to algae	LC50 - Algae - 0.015 mg/l - 28 h

12.2 Persistence and degradability

12.3 Bioaccumulative potential

Bioaccumulation	Pimephales promelas (fathead minnow) - 8 Months - 1.8 µg/l
	Bioconcentration factor (BCF): 238,000

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2315 Class: 9 Packing group: II
Proper shipping name: Polychlorinated biphenyls, liquid
Reportable Quantity (RQ): 1 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 2315 Class: 9 Packing group: II EMS-No: F-A, S-A

Proper shipping name: POLYCHLORINATED BIPHENYLS, LIQUID
Marine pollutant: yes

IATA

UN number: 2315 Class: 9 Packing group: II
Proper shipping name: Polychlorinated biphenyls, liquid

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Aroclor 1254	11097-69-1	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Aroclor 1254	11097-69-1	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Aroclor 1254	11097-69-1	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Aroclor 1254	CAS-No. 11097-69-1	Revision Date 1990-06-30
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Aroclor 1254	CAS-No. 11097-69-1	Revision Date 1990-06-30

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H302	Harmful if swallowed.
H373	May cause damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
STOT RE	Specific target organ toxicity - repeated exposure

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	1
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.2 Revision Date: 02/27/2015 Print Date: 05/01/2016

SAFETY DATA SHEET

Version 5.3
Revision Date 06/25/2015
Print Date 05/11/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : AROCLOR 1260

Product Number : CRM48736
Brand : Supelco

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Carcinogenicity (Category 1B), H350

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H350 May cause cancer.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P405 Store locked up.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Hazardous components

Component		Classification	Concentration
Distillates (petroleum), hydrotreated middle			
CAS-No. EC-No. Index-No.	64742-46-7 265-148-2 649-221-00-X	Carc. 1B; H350	>= 90 - <= 100 %
Baseoil - unspecified			
CAS-No. EC-No. Index-No.	64742-53-6 265-156-6 649-466-00-2	Carc. 1B; H350	>= 30 - < 50 %
2,6-di-tert-Butyl-p-cresol			
CAS-No. EC-No.	128-37-0 204-881-4	Aquatic Acute 1; Aquatic Chronic 1; H410	>= 0.1 - < 1 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Nature of decomposition products not known.

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Distillates (petroleum), hydrotreated middle	64742-46-7	TWA	500.000000 ppm 2,000.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Remarks	The value in mg/m3 is approximate.		

		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	5 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10 mg/m3	USA. NIOSH Recommended Exposure Limits
Baseoil - unspecified	64742-53-6	TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Not classifiable as a human carcinogen		
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC:	3 - Group 3: Not classifiable as to its carcinogenicity to humans (2,6-di-tert-Butyl-p-cresol)
IARC:	3 - Group 3: Not classifiable as to its carcinogenicity to humans (Distillates (petroleum), hydrotreated middle)
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Nerves. - (Aroclor 1260)

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Distillates (petroleum), hydrotreated middle	64742-46-7	1989-08-11
Baseoil - unspecified	64742-53-6	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Distillates (petroleum), hydrotreated middle	64742-46-7	1989-08-11
Baseoil - unspecified	64742-53-6	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Distillates (petroleum), hydrotreated middle	64742-46-7	1989-08-11
Baseoil - unspecified	64742-53-6	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Aroclor 1260	11096-82-5	2008-08-01
Distillates (petroleum), hydrotreated middle	64742-46-7	2013-12-20

WARNING: This product contains a chemical known to the	CAS-No.	Revision Date

State of California to cause birth defects or other reproductive harm.	11096-82-5	2008-08-01
Aroclor 1260		

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H350	May cause cancer.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.3 Revision Date: 06/25/2015 Print Date: 05/11/2016

AccuStandard, Inc.
125 Market St., New Haven, CT 06513 USA
Tel: 203-786-5290 Fax: 203-786-5287

SAFETY DATA SHEET

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

1.1 - Product Identifiers

Catalog Name: C-268S-M

Description: Aroclor 1268 in Methanol

1.2 - Relevant Identified Uses of the Substance or Mixture

Laboratory Chemical Reference Material

1.3 - Supplier Details

Company: AccuStandard, Inc.
125 Market St.
New Haven, CT 06513 USA

Telephone Number: 203-786-5290

Fax: 203-786-5287

Email: edocs@accustandard.com

1.4 - Emergency Telephone Number

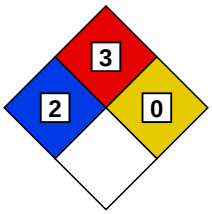
Emergency Phone #: AccuStandard, Inc.
1-203-502-7070 (USA)
+001-203-502-7070 (International)

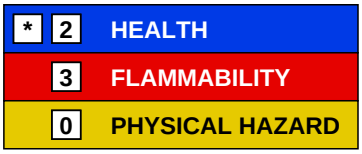
24 hours / 7 days a week

SECTION 2 - HAZARDS IDENTIFICATION

2.1 - GHS Label Elements







Signal Word: Danger

Hazard Codes:

H225 - Highly Flammable (Flammable liquids, category 2)

H301 - Toxic if swallowed. (Acute toxicity, oral, category 3)

H311 - Toxic if absorbed through skin. (Acute toxicity, dermal, category 3)

H315 - Irritating to skin. (Skin corrosion/irritation, category 2)

H320 - Irritating to eyes. (Eye damage/irritation, category 2B)

H332 - Harmful if inhaled. (Acute toxicity, inhalation, category 4)

H336 - Overexposure may cause dizziness, nausea, muscle weakness, narcosis and respiratory failure.

H360 - California Proposition 65 Warning: This product contains a component (or components) that may cause birth defects or other reproductive harm in a quantity greater than or equal to 0.1%.

H370 - Causes damage to organs. (Specific target organ toxicity, single exposure, category 1)

Precautionary Codes:

SECTION 2 - HAZARDS IDENTIFICATION *- continued*

2.1 - GHS Label Elements *- continued*

P202 - This product should only by used by persons trained in the safe handling of hazardous chemicals.

P233 - Store in a tightly closed container. (P404)

P262 - Do not get in eyes, on skin or clothing.

P264 - Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available.

P280 - Protective gloves must be worn to prevent skin contact.

P284 - Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), or a risk assessment shows air-purifying respirators are appropriate, use of a NIOSH/MSHA approved air supplied respirator is advised. Use a full-face respirator with multi-purpose combination (US) or type ABEK (EN14387) respirator cartridges in absence of proper environmental control. Always use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Engineering and/or administrative controls should be implemented to reduce exposure.

P331 - Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person.

P338 - Eye contact: Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers.

P360 - Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.

2.2 - Other Hazards

2.2.1 - Symptom of Exposure Health/Environment

Highly Flammable (Flammable liquids, category 2)

Causes damage to organs. (Specific target organ toxicity, single exposure, category 1)

After ingestion or inhalation, initial symptoms may be only that of mild intoxication, but may become severe after 12 or 18 hours.

POISON: May be fatal or cause blindness if swallowed.

Overexposure may cause dizziness, nausea, muscle weakness, narcosis and respiratory failure.

2.2.2 - Potential Health Effects

Irritating to eyes. (Eye damage/irritation, category 2B)

Irritating to skin. (Skin corrosion/irritation, category 2)

Toxic if absorbed through skin. (Acute toxicity, dermal, category 3)

Irritating to mucous membrane and upper respiratory system.

Harmful if inhaled. (Acute toxicity, inhalation, category 4)

Toxic if swallowed. (Acute toxicity, oral, category 3)

2.2.3 - Routes of Entry

Inhalation, ingestion or skin contact.

2.2.4 - Carcinogenicity

California Proposition 65 Warning: This product contains a component (or components) that may cause birth defects or other reproductive harm in a quantity greater than or equal to 0.1%.

California Proposition 65 Warning: This product contains a component (or components) that may cause cancer in a concentration less than 0.1%.

Contains one or more components that are classified (ACGIH, IARC, NTP, OSHA) as a possible cancer hazard in quantities less than 0.1%.

SECTION 3 - COMPOSITION / ANALYTES DATA

Description: Aroclor 1268 in Methanol

			ACGIH -TLV (mg/m³)			OSHA -PEL (mg/m³)		
Analyte	CAS #	% Concentration	TWA	STEL	Skin	TWA	STEL	Skin
Aroclor 1268	11100-14-4	0.004						
Methanol	67-56-1	99.996				260		

SECTION 4 - FIRST AID MEASURES

4.1 - First Aid Procedures - General

Get medical assistance for all cases of overexposure.

4.2 - Eye Contact

Eye contact: Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. (P338)

4.3 - Skin Contact

Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse. (P360)

4.4 - Inhalation

Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek immediate medical attention.

4.5 - Ingestion

Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person. (P331)

SECTION 5 - FIRE FIGHTING MEASURES

5.1 - Flammable Properties

Dangerous fire and explosive hazard.

Containers can build up pressure if exposed to heat.

Vapors can travel to a source of ignition and flash back.

During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

5.2 - Extinguishing Media

Use alcohol foam, carbon dioxide, dry chemical, or water spray when fighting fires involving this material.

5.3 - Protection of Firefighters

As in any fire, wear self-contained breathing apparatus pressure demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

6.1 - Spill Response

Wear suitable protective equipment listed under Exposure Controls / Personal Protection. Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards. Contain the release and eliminate its source, if this can be done without risk. Dispose as hazardous waste. Comply with Federal, State and local regulations.

SECTION 7 - HANDLING AND STORAGE

Store in a tightly closed container. (P404)

Store in a cool area away from ignition sources and oxidizers.

Sonicate before use.

Avoid breathing vapors or mists.

Use with adequate ventilation.

Do not get in eyes, on skin or clothing. (P262)

Avoid prolonged or repeated exposure.

This product should only by used by persons trained in the safe handling of hazardous chemicals. (P202)

SECTION 8 - EXPOSURE CONTROLS

8.1 - Engineering Controls/PPE

Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available. (P264)

8.2 - General Hygene Considerations

Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), or a risk assessment shows air-purifying respirators are appropriate, use of a NIOSH/MSHA approved air supplied respirator is advised. Use a full-face respirator with multi-purpose combination (US) or type ABEK (EN14387) respirator cartridges in absence of proper environmental control. Always use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Engineering and/or administrative controls should be implemented to reduce exposure.

Material should be handled or transferred in an approved fume hood or with adequate ventilation.

Protective gloves must be worn to prevent skin contact. (P280)

(Chloroprene, natural rubber, nitrile, or equivalent)

Use eye protection tested and approved under the appropriate government standards such as NIOSH (US) or EN 166 (EU).

All recommendations are advisory only and must be evaluated by an industrial hygienist and/or safety officer familiar with the specific situation of anticipated use, such as concentration and amount of the substance in the workplace. Any recommendation should not be construed as offering an approval for any specific use of the product.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear liquid

Odor: N/A

Odor Threshold: N/A

pH: N/A

Melting Point: -93.9 °C

Boiling Point: 65 °C

Flash Point: 52 °F (11 °C) (tcc)

Evaporation Rate (Butyl Acetate=1): 5.9

Flammability Class: N/A

Lower Flammability Level: 6.7

Upper Flammability Level: 36.5

Vapor Pressure: 97 mmHg (20 °C)

Vapor Density (Air = 1): 1.1 g/L

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES *- continued*

Specific Gravity: 0.791 g/cm3

Solubility in Water: Very soluble

Partition Coefficient: log Pow: -0.77

Autoignition Temperature: 385 °C

Decomposition Temperature: N/A

Viscosity: N/A

VOC Content: N/A

Percent Volatile: 99.9+

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable

Materials to Avoid: Acids
Oxidizers

Hazardous Decomposition: Oxides of carbon; Formaldehyde

Hazardous Polymerization: Will not occur

Condition to Avoid: Heat; Contact with ignition sources

SECTION 11 - TOXICOLOGICAL INFORMATION

Human Health Toxicity

See section 2 for specific toxicological information for the ingredients of this product.

LD50 (Oral): Human - 143 mg/kg; Rat - 1500 mg/kg

LD50 (Dermal) : Rabbit - >2000 mg/kg

LC50 (Inhalation): Rat - >20 mg/L

WARNING: This product contains chemical(s) known to the state of California to cause cancer and to cause birth defects or other reproductive harm.

No other information related to the toxicological properties of this product is available at this time.

SECTION 12 - ECOLOGICAL INFORMATION

Environmental Toxicity

By complying with sections 6 and 7 there should be no release to the environment.

LC50 (Fish): >1000 mg/L 96H

EC50 (Aquatic Invertebrate): >1000 mg/L 48H

BCF: 1.0

Hydrolyzes readily on contact with water. Readily biodegradable.

No other information related to the ecological properties of this product is available at this time.

SECTION 13 - DISPOSAL CONSIDERATIONS

Recycle or incinerate at any EPA approved facility or dispose in compliance with Federal, State and local regulations. Empty containers must be triple-rinsed prior to disposal.

SECTION 14 - TRANSPORT INFORMATION

Transportation Information (DOT/IATA)

UN Number: UN1230

Class: 3

Packing Group: II

Proper Shipping Name: Methanol

Poison by Inhalation: No

Marine Pollutant: No

SECTION 15 - REGULATORY INFORMATION

WARNING: This product contains chemical(s) known to the state of California to cause cancer and to cause birth defects or other reproductive harm.

This product contains a compound or compounds subject to EU Regulation (EC) No 1907/2006 (REACH) on Annex XIV, Annex XVII, and/or Article 59. Refer to the below table for details.

This product is subject to SARA section 313 reporting requirements.

All components are listed on the TSCA Inventory.

For laboratory, research and development use only. Not for manufacturing or commercial purposes.

In addition to federal and state regulations, local regulations may apply. Check with your local regulatory authorities.

			REACH (1907/2006)		
Analyte	CAS #	% Concentration	Annex XIV	Annex XVII	Article 59
Methanol	67-56-1	99.996		X	

SECTION 16 - OTHER INFORMATION

This document has been designed to meet the requirements of OSHA, ANSI, GHS and CHIPs regulations. Chemicals are classified using the Globally Harmonized System for Classification and Labeling of Chemicals and CLP Regulation (EC) No. 1272/2008.

The statements contained herein are offered for informational purposes only and are based on technical data that we believe to be accurate. The manufacturer will not assume any liability for the accuracy and completeness of this information. Final determination of the suitability of the material is the responsibility of the user. Although certain hazards are described herein, the user should not presume that these are the only hazards that exist. Since conditions and manner of use are outside of the manufacturers control, we make

NO WARRANTY OF MERCHANTABILITY, EXPRESSED OR IMPLIED, AND ASSUME NO LIABILITY RESULTING FROM ITS USE.

Legend : N/A = Not Available ND = Not Determined NR = Not Regulated

Alteration of any information contained herein without written permission from the manufacturer is strictly prohibited.

HMIS/NFPA HAZARD INDEX

0 - Minimal
1 - Slight
2 - Moderate
3 - Serious
4 - Severe

* - Additional Hazard

GHS HAZARD INDEX

Category 1 - Most Severe
Category 5 - Least Severe

**** End of Document ****

SAFETY DATA SHEET

Version 6.10
Revision Date 09/06/2024
Print Date 09/07/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Arsenic

Product Number : 202657
Brand : Aldrich
Index-No. : 033-001-00-X
CAS-No. : 7440-38-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 3), H331
Skin irritation (Category 2), H315

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Serious eye damage (Category 1), H318
Carcinogenicity (Category 1A), H350
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word	Danger
Hazard Statements	
H301 + H331	Toxic if swallowed or if inhaled.
H315	Causes skin irritation.
H318	Causes serious eye damage.
H350	May cause cancer.
H410	Very toxic to aquatic life with long lasting effects.
Precautionary Statements	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P261	Avoid breathing dust.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

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SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	As
Molecular weight	:	74.92 g/mol
CAS-No.	:	7440-38-2
EC-No.	:	231-148-6
Index-No.	:	033-001-00-X

Component	Classification	Concentration
arsenic		
	Acute Tox. 3; Skin Irrit. 2; Eye Dam. 1; Carc. 1A; Aquatic Acute 1; Aquatic Chronic 1; H301, H331, H315, H318, H350, H400, H410 M-Factor - Aquatic Acute: 10 M-Factor - Aquatic Chronic: 1	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
If swallowed: give water to drink (two glasses at most). Seek medical advice immediately. In exceptional cases only, if medical care is not available within one hour, induce vomiting (only in persons who are wide awake and fully conscious), administer activated charcoal (20 - 40 g in a 10% slurry) and consult a doctor as quickly as possible.

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4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Nature of decomposition products not known.
Not combustible.
Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

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SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class
Storage class (TRGS 510): 6.1A: Combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
arsenic	7440-38-2	TWA	0.01 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Lung cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed human carcinogen		
		C	0.0020 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A 15 minute ceiling value		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
arsenic	7440-38-2	inorganic arsenic plus methylated metabolites	15µg/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)

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	Remarks	End of shift			
		inorganic arsenic plus methylated metabolites	15µg/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of the workweek (After four or five consecutive working days with exposure)			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter type P3
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

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Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Color: gray
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 817 °C (1503 °F) - lit.
f)	Initial boiling point and boiling range	613 °C 1135 °F - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	5.727 g/mL at 25 °C (77 °F) - lit.
	Relative density	5.622.4 °C - OECD Test Guideline 109
n)	Water solubility	ca.0.0106 g/l at 20 °C (68 °F) - OECD Test Guideline 105 - slightly soluble
o)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances
p)	Autoignition temperature	> 430 °C (> 806 °F)does not ignite
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

No data available

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SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Exothermic reaction with:
Aluminum
Bromine
bromates
chlorates
iodates
Nitric acid
Risk of ignition or formation of inflammable gases or vapours with:
nitrates
Alkali metals
Zinc
Reducing agents
Strong oxidizing agents
Risk of explosion with:
potassium permanganate
azides
halogen-halogen compounds
Peroxides
nitrogen trichloride

10.4 Conditions to avoid
Heat. Exposure to air may affect product quality.
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Mouse - 145 mg/kg
Remarks: Behavioral:Ataxia.
Diarrhea
(RTECS)
Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

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Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
Skin - In vitro study
Result: Irritating to skin. - 15 min
Remarks: (ECHA)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Causes serious eye damage. - 24 h
(OECD Test Guideline 405)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Test Type: Ames test
Test system: Escherichia coli
Result: negative
Remarks: (ECHA)

Carcinogenicity
May cause cancer. Positive evidence from human epidemiological studies.

IARC:	1 - Group 1: Carcinogenic to humans (arsenic)
NTP:	Known - Known to be human carcinogen (arsenic)
OSHA:	OSHA specifically regulated carcinogen (arsenic)

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: CG0525000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

The following applies to arsenic and its compounds in general: they take effect as capillary and enzyme toxins. Symptoms of arsenic poisoning: acute: after inhalation, mucosal irritations with coughing, dyspnoea, pain in the thorax. Perforations within the respiratory tract are possible. After oral uptake, gastrointestinal disorders with vomiting, diarrhoea, and spasms, CNS disorders with headache, confusion, shaking fits and disturbed consciousness, cardiovascular disorders all the way to circulatory collapse. Chronic: exanthema, dermal lesions in the form of hyperkeratosis and hypermelanosis, loss of hair,

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conjunctivitis and polyneuropathy, impaired hepatic function, and renal damage. After accumulation in the liver, kidneys, and skin, arsenic is eliminated from the organism only slowly. Experience has shown arsenic compounds to be carcinogenic in man.

Other dangerous properties can not be excluded.

This substance should be handled with particular care.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	static test LC50 - Oreochromis mossambicus (Mozambique tilapia) - 28.68 mg/l - 96 h Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Bosmina longirostris (water flea) - 0.85 mg/l - 48 h Remarks: (ECHA)
Toxicity to algae	static test NOEC - Macrocystis pyrifera (brown algae) - 0.04 mg/l - 42 h Remarks: (ECHA)
Toxicity to bacteria	static test EC50 - activated sludge - 10.6 mg/l - 10 Days Remarks: (ECHA)
Toxicity to fish(Chronic toxicity)	flow-through test NOEC - Pimephales promelas (fathead minnow) - 2.13 mg/l - 35 d Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	flow-through test NOEC - Shrimp - 0.631 mg/l - 51 d Remarks: (ECHA)

12.2 Persistence and degradability

The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

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12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)

UN number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic
Reportable Quantity (RQ): 1 lbs
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG

UN number: 1558 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: ARSENIC
Marine pollutant : yes

IATA

UN number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
arsenic	7440-38-2	1	1
arsenic	7440-38-2	1	1 (D004)

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SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards	:	Acute Health Hazard Chronic Health Hazard
SARA 313	:	The following components are subject to reporting levels established by SARA Title III, Section 313:

arsenic	7440-38-2	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

arsenic	7440-38-2

Pennsylvania Right To Know

arsenic	7440-38-2

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

arsenic	7440-38-2

Washington Chemicals of High Concern

arsenic	7440-38-2

California Prop. 65

WARNING: This product can expose you to chemicals including arsenic, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA	:	All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact

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Version: 6.10 Revision Date: 09/06/2024 Print Date: 09/07/2024

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SAFETY DATA SHEET

Version 4.5
Revision Date 03/02/2015
Print Date 05/24/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Barium

Product Number : 237094
Brand : Aldrich

CAS-No. : 7440-39-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Substances and mixtures, which in contact with water, emit flammable gases (Category 2), H261
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H261 In contact with water releases flammable gases.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.

Precautionary statement(s)
P223 Keep away from any possible contact with water, because of violent reaction and possible flash fire.
P231 + P232 Handle under inert gas. Protect from moisture.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.

P280	Wear protective gloves/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P402 + P404	Store in a dry place. Store in a closed container.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Ba
Molecular weight	:	137.33 g/mol
CAS-No.	:	7440-39-3
EC-No.	:	231-149-1

Hazardous components

Component	Classification	Concentration
Barium		
	Water-react. 2; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; H261, H315, H319, H335	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Dry powder

5.2 Special hazards arising from the substance or mixture
Barium oxide

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.Keep away from sources of ignition - No smoking.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Store under inert gas.
Storage class (TRGS 510): Hazardous materials, which set free flammable gases upon contact with water

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Barium	7440-39-3	TWA	0.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye, skin, & Gastrointestinal irritation Muscular stimulation Not classifiable as a human carcinogen		

		TWA	0.500000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Eye irritation Muscular stimulation Skin irritation Gastrointestinal irritation Not classifiable as a human carcinogen		
		TWA	0.500000 mg/m3	USA. NIOSH Recommended Exposure Limits

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
impervious clothing, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: Rods

		Colour: grey
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 725 °C (1,337 °F) - lit.
f)	Initial boiling point and boiling range	1,640 °C (2,984 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	3.6 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Reacts violently with water.

10.4 Conditions to avoid
Exposure to moisture

10.5 Incompatible materials
Oxidizing agents, Water, acids, Oxygen, Chlorinated solvents, Carbon dioxide (CO2), Halogens, Halogenated hydrocarbon, Alcohols, Sulphur compounds, Hydrogen sulfide gas

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: CQ8370000

Stomach/intestinal disorders, Nausea, Vomiting, Drowsiness, Dizziness, Gastrointestinal disturbance, Weakness, Tremors, Seizures.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality NOEC - Cyprinodon variegatus (sheepshead minnow) - 500 mg/l - 96 h
	LC50 - Cyprinodon variegatus (sheepshead minnow) - > 500 mg/l - 96 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1400 Class: 4.3 Packing group: II
Proper shipping name: Barium
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1400 Class: 4.3 Packing group: II EMS-No: F-G, S-O
Proper shipping name: BARIUM

IATA
UN number: 1400 Class: 4.3 Packing group: II
Proper shipping name: Barium

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

SARA 311/312 Hazards
Reactivity Hazard, Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date

Barium	7440-39-3	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Eye Irrit.	Eye irritation
H261	In contact with water releases flammable gases.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
Skin Irrit.	Skin irritation
STOT SE	Specific target organ toxicity - single exposure
Water-react.	Substances and mixtures, which in contact with water, emit flammable gases

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	
Flammability:	3
Physical Hazard	1

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	1
Special hazard.I:	W

Further information
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Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.5 Revision Date: 03/02/2015 Print Date: 05/24/2016

SAFETY DATA SHEET

Benzene

Section 1. Identification

GHS product identifier : Benzene

Chemical name : benzene

Other means of identification : benzene, purebenzol; cyclohexatriene; phenyl hydride; phene; coal naphtha; pyrobenzol

Product use : Synthetic/Analytical chemistry.

Synonym : benzene, purebenzol; cyclohexatriene; phenyl hydride; phene; coal naphtha; pyrobenzol

SDS # : 001062

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Emergency telephone number (with hours of operation) : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 2
SKIN CORROSION/IRRITATION - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2
GERM CELL MUTAGENICITY - Category 1B
CARCINOGENICITY - Category 1
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (bone marrow) - Category 1

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements : Highly flammable liquid and vapor.
May form explosive mixtures with air.
Causes serious eye irritation.
Causes skin irritation.
May cause genetic defects.
May cause cancer.
Causes damage to organs through prolonged or repeated exposure. (bone marrow)

Precautionary statements

General : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

Powered by IHS

Section 2. Hazards identification

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Do not breathe vapor. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.

Response : Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. Rinse mouth. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing. If skin irritation occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Store locked up. Store in a well-ventilated place. Keep cool.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : benzene

Other means of identification : benzene, purebenzol; cyclohexatriene; phenyl hydride; phene; coal naphtha; pyrobenzol

CAS number/other identifiers

CAS number : 71-43-2

Product code : 001062

Ingredient name	%	CAS number
benzene	100	71-43-2

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

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Section 4. First aid measures

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : No known significant effects or critical hazards.

Skin contact : Causes skin irritation.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : Harmful if swallowed. Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

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Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet.

Specific hazards arising from the chemical : Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

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Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
benzene	**ACGIH TLV (United States, 3/2012).** **Absorbed through skin.** STEL: 8 mg/m³ 15 minutes. STEL: 2.5 ppm 15 minutes. TWA: 1.6 mg/m³ 8 hours. TWA: 0.5 ppm 8 hours. **NIOSH REL (United States, 1/2013).** STEL: 1 ppm 15 minutes. TWA: 0.1 ppm 10 hours. **OSHA PEL (United States, 6/2010).** STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours. **OSHA PEL Z2 (United States, 11/2006).** AMP: 50 ppm 10 minutes. CEIL: 25 ppm TWA: 10 ppm 8 hours.

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Section 8. Exposure controls/personal protection

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid. [Watery liquid.]

Color : Colorless. Yellowish.

Molecular weight : 78.12 g/mole

Molecular formula : C6-H6

Boiling/condensation point : 80.09°C (176.2°F)

Melting/freezing point : 5.49°C (41.9°F)

Critical temperature : 288.95°C (552.1°F)

Odor : Characteristic.

Odor threshold : Not available.

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Section 9. Physical and chemical properties

pH	:	Not available.
Flash point	:	Closed cup: -11°C (12.2°F)
Burning time	:	Not applicable.
Burning rate	:	Not applicable.
Evaporation rate	:	3.5 (butyl acetate = 1)
Flammability (solid, gas)	:	Not available.
Lower and upper explosive (flammable) limits	:	Lower: 1.2% Upper: 7.8%
Vapor pressure	:	10 kPa (75.006094245 mm Hg) [room temperature]
Vapor density	:	2.7 (Air = 1)
Specific Volume (ft^3/lb)	:	1.1403
Gas Density (lb/ft^3)	:	0.877 (20°C / 68 to °F)
Relative density	:	0.88
Solubility	:	Not available.
Solubility in water	:	1.88 g/l
Partition coefficient: n-octanol/water	:	2.13
Auto-ignition temperature	:	498°C (928.4°F)
Decomposition temperature	:	Not available.
SADT	:	Not available.
Viscosity	:	Dynamic (room temperature): 0.604 mPa·s (0.604 cP)

Section 10. Stability and reactivity

Reactivity	:	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	:	The product is stable.
Possibility of hazardous reactions	:	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	:	Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.
Incompatibility with various substances	:	Highly reactive or incompatible with the following materials: oxidizing materials.
Hazardous decomposition products	:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Hazardous polymerization	:	Under normal conditions of storage and use, hazardous polymerization will not occur.

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Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
benzene	LC50 Inhalation Gas. LD50 Oral	Rat Rat	10000 ppm 930 mg/kg	7 hours -

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
benzene	Eyes - Moderate irritant Eyes - Severe irritant Skin - Mild irritant Skin - Mild irritant Skin - Moderate irritant	Rabbit Rabbit Rat Rabbit Rabbit	- - - - -	88 milligrams 24 hours 2 milligrams 8 hours 60 microliters 24 hours 15 milligrams 24 hours 20 milligrams	- - - - -

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
benzene	+	1	Known to be a human carcinogen.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
benzene	Category 1	Not determined	bone marrow

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : No known significant effects or critical hazards.

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Section 11. Toxicological information

Skin contact : Causes skin irritation.

Ingestion : Harmful if swallowed. Irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : Causes damage to organs through prolonged or repeated exposure.

Carcinogenicity : May cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : May cause genetic defects.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

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Section 12. Ecological information

Product/ingredient name	$LogP_{ow}$	BCF	Potential
benzene	2.13	11	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Benzene (I,T)	71-43-2	Listed	U019

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1114	UN1114	UN114	UN1114	UN1114
UN proper shipping name	BENZENE	BENZENE	BENZENE	BENZENE	BENZENE
Transport hazard class(es)	3 	3 	3 	3 	3 
Packing group	II	II	II	II	II
Environment	No.	No.	No.	No.	No.
Additional information	**Reportable quantity** 10 lbs / 4.54 kg [1.3675 gal / 5.1767 L] Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.	**Explosive Limit and Limited Quantity Index** 1 **Passenger Carrying Road or Rail Index** 5	-	-	**Passenger and Cargo Aircraft**Quantity limitation: 5 L **Cargo Aircraft Only** Quantity limitation: 60 L **Limited Quantities - Passenger Aircraft** Quantity limitation: 1 L

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Section 14. Transport information

	Limited quantity Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: 5 L **Cargo aircraft** Quantity limitation: 60 L **Special provisions** IB2, T4, TP1				

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Water Act (CWA) 307: benzene

Clean Water Act (CWA) 311: benzene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

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Section 15. Regulatory information

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
benzene	100	Yes.	No.	No.	Yes.	Yes.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	benzene	71-43-2	100
Supplier notification	benzene	71-43-2	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : This material is listed.

New York : This material is listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)

Canada inventory : This material is listed or exempted.

International regulations

International lists : **Australia inventory (AICS)**: This material is listed or exempted.
China inventory (IECSC): This material is listed or exempted.
Japan inventory: This material is listed or exempted.
Korea inventory: This material is listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): This material is listed or exempted.
Philippines inventory (PICCS): This material is listed or exempted.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

Canada

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Section 15. Regulatory information

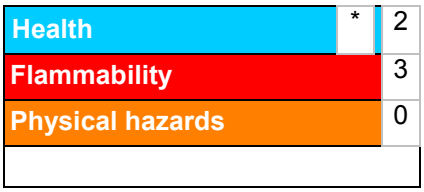
WHMIS (Canada) : Class B-2: Flammable liquid
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

CEPA Toxic substances: This material is listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class B-2: Flammable liquid
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of printing : 4/26/2015.

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Date of previous issue : 10/16/2014.

Version : 0.03

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Section 16. Other information

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United NationsACGIH – American Conference of Governmental Industrial Hygienists
AIHA – American Industrial Hygiene Association
CAS – Chemical Abstract Services
CEPA – Canadian Environmental Protection Act
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)
CFR – United States Code of Federal Regulations
CPR – Controlled Products Regulations
DSL – Domestic Substances List
GWP – Global Warming Potential
IARC – International Agency for Research on Cancer
ICAO – International Civil Aviation Organisation
Inh – Inhalation
LC – Lethal concentration
LD – Lethal dosage
NDSL – Non-Domestic Substances List
NIOSH – National Institute for Occupational Safety and Health
TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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SAFETY DATA SHEET

Based on Directive 2001/58/EC et seq. of the Commission of the European Communities

BENZ[a]ANTHRACENE

1. Identification of the substance/preparation and of the company/undertaking

1.1 Identification of the substance or preparation:

Synonyms: benzo(a)anthracene

CAS No.	: 56-55-3	**BCR number**	: BCR-271
EC index No.	: 601-033-00-9	**NFPA code**	: N.D.
EINECS No.	: 200-280-6	**Molecular weight**	: 228.30
RTECS No.	: CV9275000	**Formula**	: C18H12

1.2 Use of the substance or the preparation:
Certified reference material for laboratory use only

1.3 Company/undertaking identification:
Institute for Reference Materials and Measurements
Retieseweg
B-2440 Geel
Tel. : +32 14 57 12 11
Fax : +32 14 58 42 73

1.4 Telephone number for emergency:
+32 70 245 245
Antigifcentrum
p/a Militair Hospitaal Koningin Astrid, Bruynstraat, B-1120 Brussel

2. Composition/information on ingredients

Hazardous ingredients	CAS No. EINECS No.	Conc. in %	Hazard symbol	Risks (R-phrases)
Benzo[a]anthracene	56-55-3 200-280-6	100	T;N	45-50/53 (1)

(1) For R-phrases in full: see heading 16

3. Hazards identification

- May cause cancer
- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

4. First aid measures

4.1 Eye contact:
- Consult a doctor/medical service if irritation persists
- Rinse immediately with water

4.2 Skin contact:
- Consult a doctor/medical service if irritation persists
- Wash with water and soap
- Remove clothing before washing

4.3 After inhalation:
- Consult a doctor/medical service if breathing problems develop
- Remove the victim into fresh air
- Unconscious: maintain adequate airway and respiration

4.4 After ingestion:
- Consult a doctor/medical service if you feel unwell
- Immediately give lots of water to drink
- Never give water to an unconscious person

5. Fire-fighting measures

5.1 Suitable extinguishing media:
- Water spray
- Alcohol foam
- Polymer foam
- ABC powder
- Carbon dioxide

5.2 Unsuitable extinguishing media:
- Solid water jet ineffective as extinguishing medium

5.3 Special exposure hazards:
- Not easily combustible
- Upon combustion CO and CO2 are formed

5.4 Instructions:
- Take account of toxic firefighting water
- Use firefighting water moderately and contain it

5.5 Special protective equipment for firefighters:
- Heat/fire exposure: compressed air/oxygen apparatus
- Dust cloud production: compressed air/oxygen apparatus

6. Accidental release measures

6.1 Personal protection/precautions: see heading 8.1/8.3/10.3

6.2 Environmental precautions:
- Prevent soil and water pollution
- Substance must not be discharged into the sewer
- Dam up the solid spill

6.3 Methods for cleaning up:
- Stop dust cloud by covering with sand/earth
- Carefully collect the spill/leftovers
- Scoop solid spill into closing containers
- Take collected spill to manufacturer/competent authority
- Clean contaminated surfaces with an excess of water
- Wash clothing and equipment after handling

7. Handling and storage

7.1 Handling:
- Observe strict hygiene
- Avoid prolonged and repeated contact with skin
- Avoid raising dust
- Do not discharge the waste into the drain
- Remove contaminated clothing immediately

7.2 Storage:
- Keep container tightly closed. Store in a cool area. Store in a dry area.
- Store in a dark area.
- Keep away from: heat sources, ignition sources, oxidizing agents, acids

Storage temperature : N.D. **°C**
Quantity limits : N.D. **kg**
Storage life : N.D.
Materials for packaging :
- suitable : no data available

- to avoid : no data available

7.3 Specific uses:
See information supplied by the manufacturer

8. Exposure controls/Personal protection

8.1 Exposure limit values:

TLV-TWA	:	**mg/m³**	-	**ppm**
TLV-STEL	:	**mg/m³**	-	**ppm**
TLV-Ceiling	:	**mg/m³**		**ppm**
OES-LTEL	:	**mg/m³**		**ppm**
OES-STEL	:	**mg/m³**		**ppm**
MAK	:	**mg/m³**		**ppm**
TRK	:	**mg/m³**		**ppm**
MAC-TGG 8 h	:	**mg/m³**		
MAC-TGG 15 min.	:	**mg/m³**		
MAC-Ceiling	:	**mg/m³**		
VME-8 h	:	**mg/m³**		**ppm**
VLE-15 min.	:	**mg/m³**		**ppm**
GWBB-8 h	:	**mg/m³**		**ppm**
GWK-15 min.	:	**mg/m³**		**ppm**
Momentary value	:	**mg/m³**		**ppm**
EC	:	**mg/m³**		**ppm**
EC-STEL	:	**mg/m³**		**ppm**

Sampling methods:

-	Benz(a)Anthracene (Polynuclear aromatic hydrocarbons)	NIOSH 5506
-	Benz(a)Anthracene (Polynuclear aromatic hydrocarbons)	NIOSH 5515
-	Benz(a)Anthracene	OSHA CSI

8.2 Exposure controls:

8.2.1 Occupational exposure controls:
- Measure the concentration in the air regularly
- Work under local exhaust/ventilation

8.2.2 Environmental exposure controls: see heading 13

8.3 Personal protection:

8.3.1 respiratory protection:
- Dust production: dust mask with filter type P3
- High dust production: compressed air/oxygen apparatus

8.3.2 hand protection:
- Gloves
  Suitable materials: No data available

- Breakthrough time: N.D.

8.3.3 eye protection:
- Safety glasses
- In case of dust production: protective goggles

8.3.4 skin protection:
- Protective clothing
- In case of dust production: head/neck protection
  Suitable materials: No data available

9. Physical and chemical properties

9.1 General information:

Appearance (at 20°C)	:	Crystalline solid / Scales
Odour	:	Odourless
Colour	:	Colourless to fluorescent yellow-green

9.2 Important health, safety and environmental information:

pH value	:	N.D.	
Boiling point/boiling range	:	N.A.	**°C**
Flashpoint	:	N.D.	**°C**
Explosion limits	:	N.D.	**vol%** (**°C**)
Vapour pressure (at 20°C)	:	0.00007	**hPa**
Vapour pressure (at 50°C)	:	N.D.	**hPa**
Relative density (at 20°C)	:	1.3	
Water solubility	:	0.00001	**g/100 ml**
Soluble in	:	Ether, acetone, oils/fats	
Relative vapour density	:	N.D.	
Viscosity	:	N.D.	**Pa.s**
Partition coëfficient n-octanol/water	:	5.61/5.79	
Evaporation rate			
ratio to butyl acetate	:	N.D.	
ratio to ether	:	N.D.	

9.3 Other information:

Melting point/melting range	:	160	**°C**
Auto-ignition point	:	N.D.	**°C**
Saturation concentration	:	N.D.	**g/m^3**

10. Stability and reactivity

10.1 Conditions to avoid/reactivity:
- Stable under normal conditions

10.2 Materials to avoid:
- Keep away from: heat sources, ignition sources, oxidizing agents, acids

10.3 Hazardous decomposition products:
- Upon combustion CO and CO2 are formed
- Reacts violently with (strong) oxidizers
- Decomposes on exposure to (strong) acids

11. Toxicological information

11.1 Acute toxicity:

LD50 oral rat	:	N.D.	**mg/kg**
LD50 dermal rat	:	N.D.	**mg/kg**
LD50 dermal rabbit	:	N.D.	**mg/kg**
LC50 inhalation rat	:	N.D.	**mg/l/4 h**
LC50 inhalation rat	:	N.D.	**ppm/4 h**

11.2 Chronic toxicity:

EC carc. cat.	:	2
EC muta. cat.	:	not listed
EC repr. cat.	:	not listed
Carcinogenicity (TLV)	:	A2
Carcinogenicity (MAC)	:	K
Carcinogenicity (VME)	:	not listed
Carcinogenicity (GWBB)	:	not listed
Carcinogenicity (MAK)	:	2
Mutagenicity (MAK)	:	not listed
Teratogenicity (MAK)	:	-
IARC classification	:	2A

11.3 Routes of exposure: ingestion, inhalation, eyes and skin
Caution! Substance is absorbed through the skin

11.4 Acute effects/symptoms:

AFTER SKIN CONTACT
- Slight irritation

11.5 Chronic effects:

- Probably human carcinogenic
- Mutagenicity: AMES test positive
- Probably human mutagenic

ON CONTINUOUS/REPEATED EXPOSURE/CONTACT:
- No specific information available

SIMILAR PRODUCTS CAUSE FOLLOWING SYMPTOMS:
- Feeling of weakness
- Photoallergy
- Skin rash/inflammation
- Cracking of the skin
- Skin cancer
- Lung tissue affection/degeneration
- Enlargement/affection of the liver
- Affection of the renal tissue

12. Ecological information

12.1 Ecotoxicity:

- LC50 (65 h) : 0.0018 mg/l (PIMEPHALES PROMELAS)
- EC50 (96 h) : 0.01 mg/l (DAPHNIA PULEX)

12.2 Mobility:

- **Volatile organic compounds (VOC):** 0%

- Photolysis in water
- Ozonation in water
- Insoluble in water

For other physicochemical properties see heading 9.

12.3 Persistence and degradability:

- **biodegradation BOD_5** : N.D. **% ThOD**
- **water** : - Not readily biodegradable in water
- **soil** : **T ½:** > 100 **days**

12.4 Bioaccumulative potential:
- **log P_{ow}** : 5.61/5.79
- **BCF** : 72 h : 350 (LEUCISCUS IDUS)
- Highly bioaccumulative

12.5 Other adverse effects:

- **WGK** : 3 (Classification based on the R-phrases in compliance with Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS) of 17 May 1999)
- **Effect on the ozone layer** : Not dangerous for the ozone layer (Council Regulation (EC) 3093/94)
- **Greenhouse effect** : no data available
- **Effect on waste water purification** : no data available

13. Disposal considerations

13.1 Provisions relating to waste:

- Waste material code (91/689/EEC, Council Decision 2001/118/EC, O.J. L47 of 16/2/2001): 16 05 06 (laboratory chemicals, consisting of or containing dangerous substances, including mixtures of laboratory chemicals)
- Waste material code (Flanders): 001, 045, 691
- Waste code (Germany): 59302
- Hazardous waste (91/689/EEC)

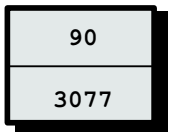
13.2 Disposal methods:

- Dissolve or mix with a combustible solvent
- Remove to an authorized incinerator equipped with an afterburner and a flue gas scrubber
- Do not discharge into surface water (2000/60/EEC, Council Decision 2455/2001/EC)

13.3 Packaging/Container:

- Waste material code packaging (91/689/EEC, Council Decision 2001/118/EC, O.J. L47 of 16/2/2001): 15 01 10 (packaging containing residues of or contaminated by dangerous substances)

14. Transport information



14.1 Classification of the substance in compliance with UN Recommendations

UN number	: 3077
CLASS	: 9
SUB RISKS	: -
PACKING	: III
PROPER SHIPPING NAME	: UN 3077, Environmentally hazardous substance, solid, n.o.s. (benzo[a]anthracene)

14.2 ADR (transport by road)

CLASS	: 9
PACKING	: III
DANGER LABEL TANKS	: 9
DANGER LABEL PACKAGES	: 9

14.3 RID (transport by rail)

CLASS	: 9
PACKING	: III
DANGER LABEL TANKS	: 9
DANGER LABEL PACKAGES	: 9

14.4 ADNR (transport by inland waterways)

CLASS	: 9
PACKING	: III
DANGER LABEL TANKS	: 9
DANGER LABEL PACKAGES	: 9

14.5 IMDG (maritime transport)

CLASS	: 9
SUB RISKS	: -
PACKING	: III
MFAG	: -
EMS	: -
MARINE POLLUTANT	: P

14.6 ICAO (air transport)

CLASS	: 9
SUB RISKS	: -
PACKING	: III
PACKING INSTRUCTIONS PASSENGER AIRCRAFT	:
PACKING INSTRUCTIONS CARGO AIRCRAFT	:

14.7 Special precautions in connection with transport : none

14.8 Limited quantities (LQ) :

When substances and their packaging meet the conditions established by ADR/RID/ADNR in chapter 3.4, **only** the following prescriptions shall be complied with:
each package shall display a diamond-shaped figure with the following inscription:
- 'UN 3077'
or, in the case of different goods with different identification numbers within a single package:
- the letters 'LQ'

15. Regulatory information

Enumerated in substance list Annex I of directive 67/548/EEC et sequens



Toxic



Dangerous for the environment

R45 : May cause cancer
R50/53 : Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

S53 : Avoid exposure - obtain special instructions before use
S45 : In case of accident or if you feel unwell, seek medical advice (show the label where possible)
S60 : This material and/or its container must be disposed of as hazardous waste
S61 : Avoid release to the environment. Refer to special instructions/safety data sheets.

16. Other information

The information provided on this MSDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

N.A. = NOT APPLICABLE
N.D. = NOT DETERMINED
***** = INTERNAL CLASSIFICATION

Full text of any R-phrases referred to under heading 2:

R45 : May cause cancer
R50/53 : Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

Exposure limits:
TLV : Threshold Limit Value - ACGIH USA 2000
OES : Occupational Exposure Standards - United Kingdom 1999
MEL : Maximum Exposure Limits - United Kingdom 1999
MAK : Maximale Arbeitsplatzkonzentrationen - Germany 2001
TRK : Technische Richtkonzentrationen - Germany 2001
MAC : Maximale aanvaarde concentratie - The Netherlands 2002
VME : Valeurs limites de Moyenne d'Exposition - France 1999
VLE : Valeurs limites d'Exposition à court terme - France 1999
GWBB : Grenswaarde beroepsmatige blootstelling - Belgium 1998
GWK : Grenswaarde kortstondige blootstelling - Belgium 1998
EC : Indicative occupational exposure limit values - directive 2000/39/EC

Chronic toxicity:
K : List of the carcinogenic substances and processes - The Netherlands 2002

Safety Data Sheet

Revision Date: 03/23/15
www.restek.com

1. IDENTIFICATION

Catalog Number / Product Name:	**31272, 31272-5XX, & 31372 / Benzo (b) Fluoranthene Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	1-800-424-9300 (CHEMTREC) +1 703-741-5970 (Outside the US)
Email:	sds@restek.com
Revision Number:	8
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:



GHS Classification:
Flammable Liquid Category 2
Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 3

GHS Signal Word:
Danger

GHS Hazard:
Highly flammable liquid and vapour.
May cause drowsiness or dizziness.

GHS Precautions:

Safety Precautions:
Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilation and lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Avoid breathing dust/fume/gas/mist/vapours/spray.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.

First Aid Measures:
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Call a POISON CENTER or doctor/physician if you feel unwell.
In case of fire: Use extinguishing media in section 5 for extinction.

Storage:
Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal:
Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs:
No data available.

Repeated Exposure Target Organs:
No data available.

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
Acetone	67-64-1	200-662-2	99.900000
benzo (b) fluoranthene	205-99-2	205-911-9	0.100000

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water spray or fog may also be effective for extinguishing if swept across the base of the fire. Water can also be used to absorb heat and keep exposed material from being damaged by fire. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Fire and/or Explosion Hazards: Vapors may be ignited by heat, sparks, flames or other sources of ignition at or above the low flash point giving rise to a Class B fire. Vapors are heavier than air and may travel to a source of ignition and flash back

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained toxic breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface. Use water spray/fog for cooling.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be irritating or harmful. Follow personal protective equipment recommendations found in Section 8 of this SDS. Additional precautions may be necessary based on special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred. Also consider the expertise of employees in the area responding to the spill.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions: Harmful or irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment

Storage Technical Measures and Conditions: Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
Acetone	67-64-1	2500 ppm IDLH (10% LEL)	750 ppm STEL 750 ppm STEL;	500 ppm TWA 500 ppm TWA; 1188 mg/m3	1000 ppm TWA; 2400 mg/m3 TWA

benzo (b) fluoranthene	205-99-2	ND	1782 mg/m3 STEL TWA No TLV		No data available.

Personal Protection:

Engineering Measures:	Local exhaust ventilation is recommended when generating excessive levels of vapors from handling or thermal processing.
Respiratory Protection:	No respiratory protection required under normal conditions of use. Provide general room exhaust ventilation if symptoms of overexposure occur as explained Section 3. A respirator is not normally required.
Eye Protection:	Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.
Skin Protection:	Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work
Medical Conditions Aggravated By Exposure:	Respiratory disease including asthma and bronchitis

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color:	Depends upon product selection
Odor:	Strong
Physical State:	No data available.
pH:	No data available
Vapor Density:	2.0 (air = 1)
Melting Point:	-95.4 °C Melting Point
Flash Point:	39
Flammability:	Highly Flammable
Upper Flammable/Explosive Limit, % in air:	No data available.
Lower Flammable/Explosive Limit, % in air:	No data available.
Autoignition Temperature:	465 deg C
Decomposition Temperature:	No data available.
Specific Gravity:	0.7845 g/cm3 at 25 °C
Evaporation Rate:	No data available.
Odor Threshold:	ND
Solubility:	Complete; 100%
Partition Coefficient: n-octanol in water:	No data available.
VOC % by weight:	0.00
Molecular Weight:	58.08

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	No data available.
Materials to Avoid / Chemical Incompatiability:	Strong oxidizing agents Strong acids
Hazardous Decomposition Products:	Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry:	Inhalation, Skin Contact, Eye Contact, Ingestion
Target Organs Potentially Affected By Exposure:	Eyes, Central nervous system stimulation, Respiratory Tract, Skin
Chemical Interactions That Change Toxicity:	None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation:	Can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.
Skin Contact:	Can cause minor skin irritation, defatting, and dermatitis.
Eye Contact:	Can cause minor irritation, tearing and reddening.
Ingestion Irritation:	May be harmful if swallowed.
Ingestion Toxicity:	Harmful if swallowed. May cause systemic poisoning.

Long-Term (Chronic) Health Effects:

Carcinogenicity:	Contains a probable or known human carcinogen.
Reproductive and Developmental Toxicity:	No data available to indicate product or any components present at greater than 0.1% may cause birth defects.
Inhalation:	Upon prolonged and/or repeated exposure, can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.
Skin Contact:	Upon prolonged or repeated contact, can cause minor

skin irritation, defatting, and dermatitis.

Component Toxicological Data:

NIOSH:

Chemical Name	CAS No.	LD50/LC50
Acetone	67-64-1	Inhalation LC50 Rat 50100 mg/m3 8 h

Component Carcinogenic Data:

OSHA:

Chemical Name	CAS No.	
Benzo(b)fluoranthene	205-99-2	Present

ACGIH:

Chemical Name	CAS No.	
Acetone	67-64-1	A4 - Not Classifiable as a Human Carcinogen
Benzo[b]fluoranthene	205-99-2	A2 - Suspected Human Carcinogen

NIOSH:

Chemical Name	CAS No.
No data available.	

NTP:

Chemical Name	CAS No.
No data available.	

IARC:

Chemical Name	CAS No.	Group No.
No data.		Group 1
No data.		Group 2A
Benzo(b)fluoranthene	205-99-2	Group 2B

12. ECOLOGICAL INFORMATION

Overview:	This material is not expected to be harmful to the ecology.
Mobility:	No data
Persistence:	No data
Bioaccumulation:	No data
Degradability:	No data
Ecological Toxicity Data:	No data available.

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product:	Spent or discarded material is a hazardous waste.
Disposal Methods:	Dispose of by incineration following Federal, State, Local, or Provincial regulations.
Waste Disposal of Packaging:	Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:

DOT Proper Shipping Name:	Acetone
UN Number:	UN1090
Hazard Class:	3
Packing Group:	II

International:

IATA Proper Shipping Name:	Acetone
UN Number:	UN1090
Hazard Class:	3
Packing Group:	II

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available.			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
Acetone	67-64-1	X	-	-	X
benzo (b) fluoranthene	205-99-2	X	X	-	-

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Benzo[b]fluoranthene	205-99-2	Prop 65 Cancer

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
Acetone	67-64-1	X	X	X	X
benzo (b) fluoranthene	205-99-2	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 05/16/14

Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding prodcuts described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

SAFETY DATA SHEET

Revision Date 10-Feb-2015 **Revision Number** 1

1. Identification

Product Name **Benzo[ghi]perylene**

Cat No. : **AC105550000; AC105550050; AC105550250; AC105551000**

Synonyms 1,12-Benzoperylene

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
Classification under 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Label Elements
None required

Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
Benzo(ghi)perylene	191-24-2	> 98

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Obtain medical attention.

Inhalation Remove from exposure, lie down. Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Obtain medical attention.

Ingestion Clean mouth with water. Get medical attention.

Most important symptoms/effects No information available.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Carbon monoxide (CO) Carbon dioxide (CO_2)
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
0	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Avoid dust formation. Sweep up or vacuum up spillage and collect in suitable container for disposal. Do not let this chemical enter the environment.

7. Handling and storage

Handling Avoid contact with skin and eyes. Do not breathe dust. Do not breathe vapors or spray mist.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin and body protection	Wear appropriate protective gloves and clothing to prevent skin exposure.
Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Hygiene Measures	Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	Yellow
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	276 - 280 °C / 528.8 - 536 °F
Boiling Point/Range	No information available > @ 760 mmHg
Flash Point	No information available
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	No information available
Relative Density	No information available
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C22 H12
Molecular Weight	276.33

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable.
Conditions to Avoid	Excess heat. Exposure to light. Incompatible products.
Incompatible Materials	Strong oxidizing agents
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO_2)
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information	No acute toxicity information is available for this product
Component Information	
Toxicologically Synergistic	No information available

Products

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Benzo(ghi)perylene	191-24-2	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Do not empty into drains.

Persistence and Degradability No information available
Bioaccumulation/ Accumulation No information available.

Mobility .

Component	log Pow
Benzo(ghi)perylene	7.23

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT Not regulated
TDG Not regulated
IATA Not regulated
IMDG/IMO Not regulated

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL

Benzo(ghi)perylene	-	-	-	205-883-8	-		-	-	-	-	-

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Benzo(ghi)perylene	191-24-2	> 98	1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Benzo(ghi)perylene	-	-	X	X

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Benzo(ghi)perylene	5000 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Benzo(ghi)perylene	X	X	X	X	-

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security

This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class Non-controlled

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Revision Date 10-Feb-2015
Print Date 10-Feb-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

Institute for Reference Materials and Measurements

SAFETY DATA SHEET

Based on Regulation (EC) No. 1907/2006 (REACH) Article 31 and Annex II

BCR-048R: benzo[k]fluoranthene

1. Identification of the substance/preparation and of the company/undertaking

1.1 Identification of the substance or preparation:

Product name: BCR-048R: benzo[k]fluoranthene

CAS number	207-08-9
EC index number	601-036-00-5
EINECS number	205-916-6
RTECS number	DF6350000
Molecular mass	252.32 g/mol
Formula	C20H12

1.2 Use of the substance/preparation:

Certified reference material for laboratory use only

1.3 Company/undertaking identification:

Institute for Reference Materials and Measurements
Retieseweg
B-2440 Geel
Tel: +32 14 57 12 11
Fax: +32 14 59 04 06
JRC-IRMM-RM-Sales@ec.europa.eu

1.4 Emergency telephone:

Poison Centre: +32 70 245 245

2. Hazards identification

NFPA: 1-1-2(*)

DSD/DPD

May cause cancer

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

Other hazards

Its dust is explosive with air

Dust cloud can be ignited by a spark

Slightly irritant to skin

Slightly irritant to eyes

Caution! Substance is absorbed through the skin

No certainty about human mutagenic properties

Highly bioaccumulative

Not readily biodegradable in water

CLP

Carc. 1B	May cause cancer. (H350)
Aquatic Acute 1	Very toxic to aquatic life. (H400)
Aquatic Chronic 1	Very toxic to aquatic life with long lasting effects. (H410)

Other hazards

Its dust is explosive with air

Dust cloud can be ignited by a spark

Slightly irritant to skin

Slightly irritant to eyes

Caution! Substance is absorbed through the skin

No certainty about human mutagenic properties

Highly bioaccumulative

Not readily biodegradable in water

3. Composition/information on ingredients

Name	CAS No EINECS/ELINCS	Conc.	Classification according to DSD/DPD	Classification according to CLP	Note
benzo[k]fluoranthene	207-08-9 205-916-6		Carc. Cat. 2; R45 N; R50-53	Carc. 1B; H350 Aquatic Acute 1; H400 Aquatic Chronic 1; H410	

4. First aid measures

4.1 After inhalation:

Remove the victim into fresh air

Respiratory problems: consult a doctor/medical service

4.2 Skin contact:

Rinse with water

Do not apply (chemical) neutralizing agents

Take victim to a doctor if irritation persists

4.3 Eye contact:

Rinse with water

Do not apply neutralizing agents

Take victim to an ophthalmologist if irritation persists

4.4 After ingestion:

Rinse mouth with water

Immediately after ingestion: give lots of water to drink

Do not induce vomiting

Consult a doctor/medical service if you feel unwell

5. Fire-fighting measures

5.1 Suitable extinguishing media:

Water spray

Polyvalent foam

ABC powder

Carbon dioxide

5.2 Unsuitable extinguishing media:

No unsuitable extinguishing media known

5.3 Special exposure hazards:

Heating increases the fire hazard

Dust cloud can be ignited by a spark

Upon combustion CO and CO2 are formed

5.4 Instructions:

Take account of toxic fire-fighting water

Use water moderately and if possible collect or contain it

5.5 Special protective equipment for fire-fighters:

Gloves

Protective clothing

Heat/fire exposure: compressed air/oxygen apparatus

6. Accidental release measures

6.1 Personal precautions:

See heading 8.2

6.2 Environmental precautions:

Dam up the solid spill

Prevent soil and water pollution

Prevent spreading in sewers

See heading 13

6.3 Methods for cleaning up:

Scoop solid spill into closing containers
Carefully collect the spill/leftovers
Clean contaminated surfaces with an excess of water
Take collected spill to manufacturer/competent authority
Wash clothing and equipment after handling

7. Handling and storage

7.1 Handling:

Avoid raising dust
Warning! Avoid exposure
Keep away from naked flames/heat
Obtain special instructions before use
Observe strict hygiene
Keep container tightly closed
Do not discharge the waste into the drain

7.2 Storage:

Safe storage requirements:

Store in a cool area
Store in a dry area
Keep container in a well-ventilated place
Keep locked up
Unauthorized persons are not admitted
Meet the legal requirements

Keep away from:

oxidizing agents
(strong) acids

7.3 Specific use(s):

See information supplied by the manufacturer for the identified use(s)

8. Exposure controls/Personal protection

8.1 Exposure limit values:

8.1.1 Occupational exposure:

If limit values are applicable and available these will be listed below.

8.1.2 Sampling methods:

Product name	Test	Number	Sampling method	Remarks
Benz(a)Anthracene	OSHA	CSI		
Benz(a)Anthracene (Polynuclear aromatic hydrocarbons)	NIOSH	5506	adsorption tubes	
Benz(a)Anthracene (Polynuclear aromatic hydrocarbons)	NIOSH	5515	adsorption tubes	

8.2 Exposure controls:

8.2.1 Occupational exposure controls:

Measure the concentration in the air regularly
Carry operations in the open/under local exhaust/ventilation or with respiratory protection
Personal protective equipment:

a) Respiratory protection:

Dust production: dust mask with filter type P3

b) Hand protection:

Gloves

c) Eye protection:

Safety glasses
In case of dust production: protective goggles

d) Skin protection:

Protective clothing

8.2.2 Environmental exposure controls:

See headings 6.2, 6.3 and 13

9. Physical and chemical properties

9.1 General information:

Physical form	Crystalline solid
	Needles
Colour	Light yellow

9.2 Important health, safety and environmental information:

Boiling point	480 °C
Vapour pressure (20°C)	< 0.00001 hPa
Solubility in water	< 0.00001 g/100 ml
Solubility in solvents	Soluble in ethanol
	Soluble in acetic acid
	Soluble in oils/fats
Log Pow	6.84

9.3 Other information:

Melting point	217 °C

10. Stability and reactivity

10.1 Conditions to avoid:

Possible fire hazard

heat sources

ignition sources

Stability

No data available

Reactions

Reacts violently with (strong) oxidizers

10.2 Materials to avoid:

oxidizing agents

(strong) acids

10.3 Hazardous decomposition products:

Upon combustion CO and CO2 are formed

11. Toxicological information

11.1 Acute toxicity:

No (test)data available.

11.2 Chronic toxicity:

Probably human carcinogenic

No certainty about human mutagenic properties

Not classified as toxic to reproduction (EC)

BCR-048R: benzo[k]fluoranthene

EC carc cat	2
Listed in SZW - List of carcinogenic substances	yes
IARC - classification	2B
MAK - Krebserzeugend Kategorie	2
MAK - Keimzellmutagen Kategorie	3B
MAK - Schwangerschaft Gruppe	-
CLP carc cat	category 1B

11.3 Acute effects/symptoms:

Inhalation:

No data available

Skin contact:

Slight irritation

Eye contact:

Slight irritation

Ingestion:

No data available

11.4 Chronic effects:

ON CONTINUOUS/REPEATED EXPOSURE/CONTACT:
No specific information available
SIMILAR PRODUCTS CAUSE FOLLOWING SYMPTOMS:
Feeling of weakness
Cracking of the skin
Skin rash/inflammation
Photoallergy
Skin cancer
Lung tissue affection/degeneration
Enlargement/affection of the liver
Affection of the renal tissue

12. Ecological information

12.1 Ecotoxicity:

No (test)data available.

12.2 Mobility:

Volatile organic compounds (VOC)	0 %
Solubility in/reaction with water	Insoluble in water
Water physicochemical processes	Forming sediments in water
Soil physicochemical processes	Adsorbs into the soil

12.3 Persistence and degradability:

Water abiotic degradation processes	Ozonation in water
Half-life soil	65 - 1400 days

Not readily biodegradable in water

12.4 Bioaccumulative potential:

Log Pow	6.84

Highly bioaccumulative

12.5 Results of PBT assessment:

Not applicable, based on available data

12.6 Other adverse effects:

Not dangerous for the ozone layer (Council Regulation (EC) no 1005/2009)

13. Disposal considerations

13.1 Provisions relating to waste:

Waste material code (Directive 2008/98/EC, decision 2001/118/EC)
16 05 06* : laboratory chemicals, consisting of or containing dangerous substances, including mixtures of laboratory chemicals
Depending on branch of industry and production process, also other EURAL codes may be applicable
Hazardous waste according to Directive 2008/98/EC

13.2 Disposal methods:

Dissolve or mix with a combustible solvent
Remove to an authorized incinerator equipped with an afterburner and a flue gas scrubber with energy recovery
Remove waste in accordance with local and/or national regulations
Do not discharge into surface water (2000/60/EC, Council decision 2455/2001/EC, O.J. L331 of 15/12/2001)

13.3 Packaging/Container:

Waste material code packaging (Directive 2008/98/EC)
15 01 10* : packaging containing residues of or contaminated by dangerous substances

{13.4 Entsorgung verschmutzter Gebinde:}

14. Transport information

ADR

Proper shipping name	Environmentally hazardous substance, solid, n.o.s.
Techn./chem. name ADR	benzo[k]fluoranthene
UN number	3077
Class	9
Packing group	III
Hazard identification number	90
Classification code	M7
Labels	9
Environmentally hazardous substance mark	yes

RID

Proper shipping name	Environmentally hazardous substance, solid, n.o.s.
Techn./chem. name RID	benzo[k]fluoranthene
UN number	3077
Class	9
Packing group	III
Classification code	M7
Labels	9
Environmentally hazardous substance mark	yes

ADNR

Proper shipping name	Environmentally hazardous substance, solid, n.o.s.
Techn./chem. name ADNR	benzo[k]fluoranthene
UN number	3077
Class	9
Packing group	III
Classification code	M7
Labels	9
Environmentally hazardous substance mark	yes

IMO

Proper shipping name	Environmentally hazardous substance, solid, n.o.s.
Techn./chem. name IMO	benzo[k]fluoranthene
UN number	3077
Class	9
Packing group	III
Labels	9
Marine pollutant	P
Environmentally hazardous substance mark	yes

ICAO

Proper shipping name	Environmentally hazardous substance, solid, n.o.s.
Techn./chem. name ICAO	benzo[k]fluoranthene
UN number	3077
Class	9
Packing group	III
Labels	9
Environmentally hazardous substance mark	yes

15. Regulatory information

15.1 EU Legislation:

DSD/DPD

Enumerated in substance list Annex I of directive 67/548/EEC et sequens





Dangerous for the environment

R-phrases

45	May cause cancer
50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

S-phrases

53	Avoid exposure - obtain special instructions before use
45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible)
60	This material and its container must be disposed of as hazardous waste
61	Avoid release to the environment. Refer to special instructions/safety data sheets.

Additional recommendations

	Restricted to professional users.

CLP

Classification and labelling according to Regulation (EC) No 1272/2008 – Annex VI and after evaluation of available test data





Signal word

Dgr	Danger

H-statements

H350	May cause cancer.
H410	Very toxic to aquatic life with long lasting effects.

P-statements

P202	Do not handle until all safety precautions have been read and understood.
P281	Use personal protective equipment as required.
P273	Avoid release to the environment.
P308 + P313	IF exposed or concerned: Get medical advice/attention.
P391	Collect spillage.
P405	Store locked up.

Supplemental information

	Restricted to professional users.

15.2 National provisions:

15.3 Specific community rules:

Enumerated in Annex XVII of Regulation (EC) No. 1907/2006: Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles.

Legislation	Reference legislation
EG/552/2009	See column 1: 28.
EG/552/2009	See column 1: 50. g)

16. Other information

The information in this safety data sheet is based on data and samples provided to BIG. The sheet was written to the best of our ability and according to the state of knowledge at that time. The safety data sheet only constitutes a guideline for the safe handling, use, consumption, storage, transport and disposal of the substances/preparations/mixtures mentioned under point 1. New safety data sheets are written from time to time. Only the most recent versions may be used. Old versions must be destroyed. Unless indicated otherwise word for word on the safety data sheet, the information does not apply to substances/preparations/mixtures in purer form, mixed with other substances or in processes. The safety data sheet offers no quality specification for the substances/preparations/mixtures in question.

Compliance with the instructions in this safety data sheet does not release the user from the obligation to take all measures dictated by common sense, regulations and recommendations or which are necessary and/or useful based on the real applicable circumstances. BIG does not guarantee the accuracy or exhaustiveness of the information provided. Use of this safety data sheet is subject to the licence and liability limiting conditions as stated in your BIG licence agreement. All intellectual property rights to this sheet are the property of BIG and its distribution and reproduction are limited. Consult your BIG licence agreement for details.

(*) = INTERNAL CLASSIFICATION (NFPA)

PBT-substances = persistent, bioaccumulative and toxic substances

DSD Dangerous Substance Directive
DPD Dangerous Preparation Directive
CLP (EU-GHS) Classification, labelling and packaging (Globally Harmonised System in Europe)

Full text of any R-phrases referred to under headings 2 and 3:

R45	May cause cancer
R50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

Full text of any H-statements referred to under headings 2 and 3:

H350	May cause cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

Full text of any classes referred to under headings 2 and 3:

Aquatic Acute	Hazardous to the aquatic environment - acute
Aquatic Chronic	Hazardous to the aquatic environment - chronic
Carc.	Carcinogenicity

SAFETY DATA SHEET

Revision Date 25-Mar-2024 **Revision Number** 4

1. Identification

Product Name **Benzo[a]pyrene**

Cat No. : **15856**

CAS No 50-32-8
Synonyms Benzo[def]chrysene.; 3,4-Benzopyrene; 3,4-Benzpyrene

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Thermo Fisher Scientific Chemicals, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Tel: 800-343-0660
Fax: 800-322-4757

Emergency Telephone Number
For information **US** call: 001-800-227-6701 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No. **US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Sensitization	Category 1
Germ Cell Mutagenicity	Category 1B
Carcinogenicity	Category 1A
Reproductive Toxicity	Category 1B

Label Elements

Signal Word
Danger

Hazard Statements
May cause an allergic skin reaction
May cause genetic defects

May cause cancer
May damage fertility. May damage the unborn child



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Avoid breathing dust/fume/gas/mist/vapors/spray
Contaminated work clothing should not be allowed out of the workplace
Wear protective gloves
Response
IF exposed or concerned: Get medical attention/advice
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation or rash occurs: Get medical advice/attention
Wash contaminated clothing before reuse
Storage
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
WARNING. Cancer - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Benzo[a]pyrene	50-32-8	> 96

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.

Ingestion Clean mouth with water and drink afterwards plenty of water. Get medical attention if symptoms occur.

Most important symptoms and effects None reasonably foreseeable. . May cause allergic skin reaction. Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature Not applicable
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Do not allow run-off from fire-fighting to enter drains or water courses.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2).
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	1	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment as required. Avoid dust formation.

Environmental Precautions Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained.

Methods for Containment and Clean Up Sweep up and shovel into suitable containers for disposal. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Avoid dust formation.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Incompatible Materials. Oxidizing agent.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH	Mexico OEL (TWA)
Benzo[a]pyrene		TWA: 0.2 mg/m³		

Legend

OSHA - Occupational Safety and Health Administration

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin and body protection	Wear appropriate protective gloves and clothing to prevent skin exposure.
Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Recommended Filter type:	Particulates filter conforming to EN 143.
Hygiene Measures	Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid
Appearance	Dark yellow
Odor	aromatic
Odor Threshold	No information available
pH	Not applicable
Melting Point/Range	175 - 179 °C / 347 - 354.2 °F
Boiling Point/Range	495 °C / 923 °F @ 760 mmHg
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	Not applicable
Specific Gravity	No information available
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	Not applicable
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	C20H12
Molecular Weight	252.31

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Incompatible products.
Incompatible Materials	Oxidizing agent
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO_2)
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information
Component Information
Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization May cause sensitization by skin contact

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Benzo[a]pyrene	50-32-8	Group 1	Reasonably Anticipated	A2	X	A2

IARC (International Agency for Research on Cancer)

IARC (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

ACGIH: (American Conference of Governmental Industrial Hygienists)
A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Endocrine Disruptor Information

Component	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Benzo[a]pyrene	Group III Chemical	Not applicable	Not applicable

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity
Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

Persistence and Degradability May persist

Bioaccumulation/ Accumulation No information available.

Mobility Is not likely mobile in the environment due its low water solubility.

Component	log Pow
Benzo[a]pyrene	6.06

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Benzo[a]pyrene - 50-32-8	U022	-

14. Transport information

DOT

UN-No UN3077
Proper Shipping Name Environmentally hazardous substances, solid, n.o.s.
Technical Name Benzo[a]pyrene
Hazard Class 9
Packing Group III

TDG

UN-No UN3077
Proper Shipping Name Environmentally hazardous substances, solid, n.o.s.
Hazard Class 9
Packing Group III

IATA

UN-No UN3077
Proper Shipping Name Environmentally hazardous substances, solid, n.o.s.
Hazard Class 9
Packing Group III

IMDG/IMO

UN-No UN3077
Proper Shipping Name Environmentally hazardous substances, solid, n.o.s.
Hazard Class 9
Packing Group III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Benzo[a]pyrene	50-32-8	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA - Per 40 CFR 751, Regulation of Certain Chemical Substances & Mixtures, Under TSCA Section 6(h) (PBT) Not applicable

TSCA 12(b) - Notices of Export Not applicable

International Inventories

Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Benzo[a]pyrene	50-32-8	X	-	200-028-5	X	-		-	X	KE-05-0184

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372. Note that PBT chemicals are not eligible for the de minimis exemption. For these chemicals, supplier notification limits are provided.
> 0 % = no low concentration cut-off set, supplier notification limit applies.

Component	CAS No	Weight %	SARA 313 - Threshold Values %	SARA 313 - Reporting threasholds
Benzo[a]pyrene	50-32-8	> 96	> 0 %	RT = 100 lb

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Benzo[a]pyrene	-	-	X	X

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355).

Component	Hazardous Substances RQs	CERCLA Extremely Hazardous Substances RQs	SARA Reportable Quantity (RQ)
Benzo[a]pyrene	1 lb	-	1 lb 0.454 kg

California Proposition 65 This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
Benzo[a]pyrene	50-32-8	Carcinogen	0.06 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Benzo[a]pyrene	X	X	X	X	X

U.S. Department of Transportation
Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Component	CAS No	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Benzo[a]pyrene	50-32-8	-	Use restricted. See item 72. (see link for restriction details) Use restricted. See item 30. (see link for restriction details) Use restricted. See item 28. (see link for restriction details) Use restricted. See item 50[a]. (see link for restriction details) Use restricted. See item 29. (see link for restriction details) Use restricted. See item 75. (see link for restriction details)	SVHC Candidate list - 200-028-5 - Carcinogenic (article 57a); Mutagenic (Article 57b); Toxic for reproduction (Article 57c); PBT (Article 57d); vPvB (Article 57e)

After the sunset date the use of this substance requires either an authorization or can only be used for exempted uses, e.g. use in scientific research and development which includes routine analytics or use as intermediate.

REACH links
https://echa.europa.eu/authorisation-list
https://echa.europa.eu/substances-restricted-under-reach
https://echa.europa.eu/candidate-list-table

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Benzo[a]pyrene	50-32-8	Not applicable	Annex III - Substance subject to release reduction	Not applicable	Not applicable

Contains component(s) that meet a 'definition' of per & poly fluoroalkyl substance (PFAS)?
See table for values

PFAS Legend
Listed = Meets the PFAS definition of the named authority

Other International Regulations

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities	Seveso III Directive (2012/18/EC) - Qualifying Quantities	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)

		for Major Accident Notification	for Safety Report Requirements		
Benzo[a]pyrene	50-32-8	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

Prepared By
Health, Safety and Environmental Department
Email: chem.techinfo@thermofisher.com
www.thermofisher.com

Revision Date 25-Mar-2024
Print Date 25-Mar-2024
Revision Summary New emergency telephone response service provider.

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Version 8.3
Revision Date 09/07/2024
Print Date 12/07/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Benzo[ghi]fluoranthene

Product Number : BCR139
Brand : Sigma-Aldrich
CAS-No. : 203-12-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Not a hazardous substance or mixture.

2.2 GHS Label elements, including precautionary statements

Not a hazardous substance or mixture.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

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operates as MilliporeSigma in the US and Canada

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	C18H10
Molecular weight	:	226.27 g/mol
CAS-No.	:	203-12-3

No components need to be disclosed according to the applicable regulations.

SECTION 4: First aid measures

4.1 Description of first-aid measures

If inhaled
After inhalation: fresh air.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most). Consult doctor if feeling unwell.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters

In the event of fire, wear self-contained breathing apparatus.

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5.4 Further information

Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid inhalation of dusts. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry.
Storage stability Recommended storage temperature
2 - 8 °C
Storage class
Storage class (TRGS 510): 11: Combustible Solids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Change contaminated clothing. Wash hands after working with substance.

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Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with impervious gloves.

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Respiratory protection
Recommended Filter type: Filter type P1
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point: 140 °C (284 °F)

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f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	No data available
	Relative density	No data available
n)	Water solubility	slightly soluble
o)	Partition coefficient: n-octanol/water	log Pow: 5.46 at 25 °C (77 °F) - Potential bioaccumulation
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
no information available

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10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

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SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

Further information
Not classified as dangerous in the meaning of transport regulations.

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SECTION 15: Regulatory information

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : Product contains substance(s) not listed on TSCA inventory.

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

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SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 8.3 Revision Date: 09/07/2024 Print Date: 12/07/2024

The life science business of Merck KGaA, Darmstadt, Germany
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Fisher Scientific

Part of Thermo Fisher Scientific

SAFETY DATA SHEET

Creation Date 01-May-2012 **Revision Date** 23-Jan-2015 **Revision Number** 2

1. Identification

Product Name **Benzoic acid**

Cat No. : **A63-500; A65-500; A68-30**

Synonyms Benzenecarboxylic acid; Benzenemethanoic acid; Phenylcarboxylic acid; Phenylformic acid; Benzeneformic acid; Carboxybenzene

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 1
Specific target organ toxicity - (repeated exposure)	Category 1
Target Organs - Lungs.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes skin irritation
Causes serious eye damage
Causes damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Do not eat, drink or smoke when using this product
Response
Get medical attention/advice if you feel unwell
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Immediately call a POISON CENTER or doctor/physician
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
May form combustible dust concentrations in air

3. Composition / information on ingredients

Component	CAS-No	Weight %
Benzoic acid	65-85-0	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Remove from exposure, lie down. Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Obtain medical attention.

Ingestion Do not induce vomiting. Obtain medical attention.

Most important symptoms/effects Causes eye burns. Repeated or prolonged skin contact may cause allergic reactions with susceptible persons.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. chemical foam.

Unsuitable Extinguishing Media No information available

Flash Point 121 °C / 249.8 °F
Method - No information available

Autoignition Temperature Not applicable 570 °C / 1058 °F
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Dust can form an explosive mixture in air.

Hazardous Combustion Products
Carbon monoxide (CO) Carbon dioxide (CO_2)
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
3	1	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation.
Environmental Precautions See Section 12 for additional ecological information.

Methods for Containment and Clean Up Sweep up or vacuum up spillage and collect in suitable container for disposal. Avoid dust formation.

7. Handling and storage

Handling Avoid contact with skin and eyes. Avoid ingestion and inhalation. Do not breathe dust.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat and sources of ignition.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	Off-white
Odor	aromatic
Odor Threshold	No information available
pH	2.5-3.5 2.9 g/l water
Melting Point/Range	121 - 123 °C / 249.8 - 253.4 °F
Boiling Point/Range	249 °C / 480.2 °F @ 760 mmHg
Flash Point	121 °C / 249.8 °F

Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	1.3 hPa @ 96 °C
Vapor Density	Not applicable
Relative Density	No information available
Solubility	soluble
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	Not applicable 570 °C / 1058 °F
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	C7 H6 O2
Molecular Weight	122.12

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Avoid dust formation.

Incompatible Materials Strong acids, Strong bases, Strong oxidizing agents, Strong reducing agents, Metals

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions Aqueous solution, May react with metals and lead to the formation of flammable hydrogen gas.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Benzoic acid	1700 mg/kg (Rat) 2565 mg/kg (Rat)	Not listed	26 mg/m³ (Rat) 1 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes, respiratory system and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Benzoic acid	65-85-0	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects Not mutagenic in AMES Test

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure Lungs

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available
Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Benzoic acid	5 mg/L EC50 = 3 h	180 mg/L LC50 96 h	EC50 = 16.85 mg/L 30 min EC50 = 16.9 mg/L 15 min	300 mg/L EC50 = 24 h 860 mg/L EC50 = 48 h

Persistence and Degradability Soluble in water Persistence is unlikely based on information available.
Bioaccumulation/ Accumulation No information available.

Mobility Is not likely mobile in the environment due its low water solubility. Will likely be mobile in the environment due to its water solubility.

Component	log Pow
Benzoic acid	1.93

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT Not regulated
TDG Not regulated
IATA Not regulated
IMDG/IMO Not regulated

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Benzoic acid	X	X	-	200-618-2	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Benzoic acid	X	5000 lb	-	-

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Benzoic acid	5000 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Benzoic acid	X	X	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

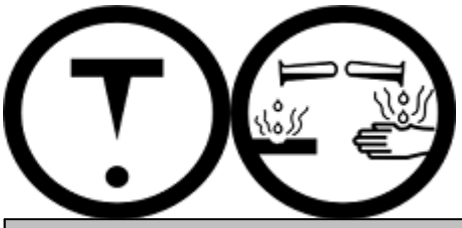
U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class E Corrosive material
D2A Very toxic materials



16. Other information

Prepared By
Regulatory Affairs
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Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

SAFETY DATA SHEET

Version 4.12
Revision Date 06/18/2015
Print Date 11/13/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name	:	Benzyl alcohol
Product Number	:	305197
Brand	:	Sigma-Aldrich
Index-No.	:	603-057-00-5
CAS-No.	:	100-51-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	:	Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052

1.4 Emergency telephone number

Emergency Phone #	:	+1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 4), H332
Eye irritation (Category 2A), H319
Acute aquatic toxicity (Category 2), H401

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word: Warning

Hazard statement(s)

H302 + H332	Harmful if swallowed or if inhaled
H319	Causes serious eye irritation.
H401	Toxic to aquatic life.

Precautionary statement(s)

P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear eye protection/ face protection.

P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

May form explosive peroxides.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Benzenemethanol
Formula	:	C_7H_8O
Molecular weight	:	108.14 g/mol
CAS-No.	:	100-51-6
EC-No.	:	202-859-9
Index-No.	:	603-057-00-5
Registration number	:	01-2119492630-38-XXXX

Hazardous components

Component	Classification	Concentration
Benzyl alcohol		
	Acute Tox. 4; Eye Irrit. 2A; Aquatic Acute 2; H302 + H332, H319, H401	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Handle and store under inert gas. hygroscopic
Storage class (TRGS 510): Combustible liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Benzyl alcohol	100-51-6	TWA	10.000000 ppm	USA. Workplace Environmental Exposure Levels (WEEL)

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 43 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -16 - -13 °C (3 - 9 °F)
f)	Initial boiling point and boiling range	203 - 205 °C (397 - 401 °F)
g)	Flash point	96 °C (205 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	5.00 hPa (3.75 mmHg) at 77 °C (171 °F) 17.7 hPa (13.3 mmHg) at 100 °C (212 °F) 0.125 hPa (0.094 mmHg) at 25 °C (77 °F)
l)	Vapour density	3.73 - (Air = 1.0)
m)	Relative density	1.045 g/mL at 25 °C (77 °F)
n)	Water solubility	33 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-	log Pow: 1.1log Pow: 1.05 at 20 °C (68 °F)

	octanol/water	
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	39 mN/m at 20 °C (68 °F)
Relative vapour density	3.73 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
hygroscopic
Stable under recommended storage conditions.
Test for peroxide formation before distillation or evaporation. Test for peroxide formation or discard after 1 year.
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
A mixture of benzyl alcohol and 58% sulfuric acid decomposed violently when heated to 180°C. Benzyl alcohol containing 1.4% hydrogen bromide and 1.1% of an iron(II) salt polymerized exothermally when heated above 100°C.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 1,230 mg/kg
Remarks: Behavioral:Somnolence (general depressed activity). Behavioral:Excitement. Behavioral:Coma.

LD50 Oral - Rat - male - 1,620 mg/kg

Dermal: No data available

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 24 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation - 24 h
(OECD Test Guideline 405)

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: DN3150000

Central nervous system depression

Liver - Irregularities - Based on Human Evidence
Liver - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Lepomis macrochirus (Bluegill) - 10 mg/l - 96 h
	LC50 - Pimephales promelas (fathead minnow) - 460 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 55 mg/l - 24 h
	- Daphnia magna (Water flea) - 230 mg/l - 48 h (OECD Test Guideline 202)

12.2 Persistence and degradability

Biodegradability	Biotic/Aerobic - Exposure time 28 d Result: 92 - 96 % - Readily biodegradable aerobic Biochemical oxygen demand - Exposure time 7 d Result: 92 - 96 % - Readily biodegradable (OECD Test Guideline 301C)

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3334 Class: 9
Proper shipping name: A Aviation regulated liquid, n.o.s. (Benzyl alcohol)
Reportable Quantity (RQ):

Poison Inhalation Hazard: No

IMDG
Not dangerous goods

IATA
UN number: 3334 Class: 9 Packing group: III
Proper shipping name: Aviation regulated liquid, n.o.s. (Benzyl alcohol)

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benzyl alcohol	100-51-6	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benzyl alcohol	100-51-6	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Benzyl alcohol	100-51-6	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox. Acute toxicity

Aquatic Acute	Acute aquatic toxicity
Eye Irrit.	Eye irritation
H302	Harmful if swallowed.
H302 + H332	Harmful if swallowed or if inhaled
H319	Causes serious eye irritation.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	1
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	1
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.12 Revision Date: 06/18/2015 Print Date: 11/13/2016

SAFETY DATA SHEET

Version 5.4
Revision Date 01/02/2015
Print Date 02/18/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Benzyl butyl phthalate

Product Number : 308501
Brand : Aldrich
Index-No. : 607-430-00-3

CAS-No. : 85-68-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Reproductive toxicity (Category 1B), H360
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H360 May damage fertility or the unborn child.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P273 Avoid release to the environment.
P281 Use personal protective equipment as required.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P391 Collect spillage.
P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_{19}H_{20}O_4$
Molecular weight	:	312.36 g/mol
CAS-No.	:	85-68-7
EC-No.	:	201-622-7
Index-No.	:	607-430-00-3

Hazardous components

Component	Classification	Concentration
Benzyl butyl phthalate Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)		
	Repr. 1B; Aquatic Acute 1; Aquatic Chronic 1; H360, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 480 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact
Material: Nature latex/chloroprene
Minimum layer thickness: 0.6 mm
Break through time: 60 min

Material tested:Lapren® (KCL 706 / Aldrich Z677558, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/freezing point: < -34.99 °C (< -30.98 °F)
f)	Initial boiling point and boiling range	370 °C (698 °F)
g)	Flash point	113.0 °C (235.4 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	19.2 hPa (14.4 mmHg) at 250.0 °C (482.0 °F) 0.3 hPa (0.2 mmHg) at 150.0 °C (302.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.1 g/cm3 at 25 °C (77 °F)
n)	Water solubility	0.00269 g/l at 25 °C (77 °F) - OECD Test Guideline 105 - slightly soluble
o)	Partition coefficient: n-octanol/water	log Pow: 4.91 at 20 °C (68 °F)
p)	Auto-ignition temperature	232.0 °C (449.6 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available

t) Oxidizing properties No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Strong bases

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 2,330 mg/kg
(OECD Test Guideline 401)

Inhalation: No data available

LD50 Dermal - Rabbit - > 10,000 mg/kg

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
- Guinea pig
Result: Does not cause skin sensitisation.

Germ cell mutagenicity
Ames test
S. typhimurium
Result: negative

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	3 - Group 3: Not classifiable as to its carcinogenicity to humans (Benzyl butyl phthalate)
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a

carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
Presumed human reproductive toxicant

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information

Repeated dose toxicity - Rat - male - Oral - No observed adverse effect level - 550 mg/kg
RTECS: TH9990000

May cause endocrine disruption.

pancreas -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Lepomis macrochirus (Bluegill) - 1.7 mg/l - 96.0 h
	NOEC - Oncorhynchus mykiss (rainbow trout) - 0.48 mg/l - 96.0 h
	flow-through test LC50 - Pimephales promelas (fathead minnow) - 2.1 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	static test LC50 - Daphnia magna (Water flea) - 1.8 mg/l - 48 h
Toxicity to algae	Growth inhibition EC50 - Desmodesmus subspicatus (green algae) - 0.31 mg/l - 72 h (OECD Test Guideline 201)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 14 d Result: 81 % - Readily biodegradable

12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 21 d - 0.00973 mg/l
	Bioconcentration factor (BCF): 663

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

Avoid release to the environment.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3082 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, liquid, n.o.s. (Benzyl butyl phthalate)
Reportable Quantity (RQ): 100 lbs
Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG
UN number: 3082 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Benzyl butyl phthalate)
Marine pollutant:yes

IATA
UN number: 3082 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, liquid, n.o.s. (Benzyl butyl phthalate)

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benzyl butyl phthalate	85-68-7	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benzyl butyl phthalate	85-68-7	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Benzyl butyl phthalate	85-68-7	1993-04-24

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Benzyl butyl phthalate	85-68-7	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H360	May damage fertility or the unborn child.

H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
Repr.	Reproductive toxicity

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	1
Physical Hazard	0

NFPA Rating

Health hazard:	1
Fire Hazard:	1
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.4 Revision Date: 01/02/2015 Print Date: 02/18/2016

SAFETY DATA SHEET

Version 4.6
Revision Date 12/29/2015
Print Date 01/29/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Beryllium

Product Number : 378135
Brand : Aldrich

CAS-No. : 7440-41-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 2), H330
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Skin sensitisation (Category 1), H317
Carcinogenicity (Category 1B), H350
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Specific target organ toxicity - repeated exposure (Category 1), H372

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H301 Toxic if swallowed.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.
H330 Fatal if inhaled.
H335 May cause respiratory irritation.
H350 May cause cancer.

H372	Causes damage to organs through prolonged or repeated exposure.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P272	Contaminated work clothing should not be allowed out of the workplace.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284	Wear respiratory protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Be
Molecular weight	:	9.01 g/mol
CAS-No.	:	7440-41-7
EC-No.	:	231-150-7

Hazardous components

Component	Classification	Concentration
Berylium foil		
	Acute Tox. 3; Acute Tox. 2; Skin Irrit. 2; Eye Irrit. 2A; Skin Sens. 1; Carc. 1B; STOT SE 3; STOT RE 1; H301, H315, H317, H319, H330, H335, H350, H372	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Beryllium oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Berylium foil	7440-41-7	TWA	2.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		CEIL	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Peak	25.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	2.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
	Remarks	Z27.29-1970		
		CEIL	5.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000micro gram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		TWA	0.000050 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Beryllium sensitization Chronic beryllium disease (berylliosis) Confirmed human carcinogen Danger of cutaneous absorption Sensitizer		
		C	0.000500 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		See Table Z-2		
		TWA	2.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		TWA	2.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000micro gram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000micro gram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		TWA	0.000050 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Beryllium sensitization		

		Chronic beryllium disease (berylliosis) Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Confirmed human carcinogen Danger of cutaneous absorption Sensitizer		
		C	0.000500 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		See Table Z-2		
		TWA	2microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		C	0.0005 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: grey
b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,278 °C (2,332 °F) - lit.
f)	Initial boiling point and boiling range	2,970 °C (5,378 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.85 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Alkali metals

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

LD50 Intravenous - Rat - 0.496 mg/kg
Remarks: Liver:Hepatitis (hepatocellular necrosis), zonal.

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Hamster
Lungs
Result: negative

Carcinogenicity

Carcinogenicity - Rat - Intratracheal
Tumorigenic:Neoplastic by RTECS criteria. Lungs, Thorax, or Respiration:Tumors. Lungs, Thorax, or Respiration:Bronchiogenic carcinoma.

Carcinogenicity - Rabbit - Intravenous
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Musculoskeletal:Tumors.

Possible human carcinogen

IARC:	1 - Group 1: Carcinogenic to humans (Berylium foil)
NTP:	Known to be human carcinogen (Berylium foil)
	Known to be human carcinogenThe reference note has been added by TD based on the background information of the NTP. (Berylium foil)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: DS1750000

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1567 Class: 6.1 (4.1) Packing group: II
Proper shipping name: Beryllium, powder
Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1567 Class: 6.1 (4.1) Packing group: II EMS-No: F-G, S-G
Proper shipping name: BERYLLIUM POWDER

IATA
UN number: 1567 Class: 6.1 (4.1) Packing group: II
Proper shipping name: Beryllium powder

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Berylium foil	7440-41-7	2008-10-10

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
H301	Toxic if swallowed.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.
H330	Fatal if inhaled.
H335	May cause respiratory irritation.
H350	May cause cancer.
H372	Causes damage to organs through prolonged or repeated exposure.
Skin Irrit.	Skin irritation
Skin Sens.	Skin sensitisation

HMIS Rating

Health hazard:	4
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	4
Fire Hazard:	3
Reactivity Hazard:	3

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

SAFETY DATA SHEET

Version 5.6
Revision Date 05/23/2016
Print Date 06/22/2017

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : β-HCH

Product Number : 33376
Brand : Sigma-Aldrich
Index-No. : 602-042-00-0

CAS-No. : 319-85-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Dermal (Category 4), H312
Carcinogenicity (Category 2), H351
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H301 Toxic if swallowed.
H312 Harmful in contact with skin.
H351 Suspected of causing cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.

P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P322	Specific measures (see supplemental first aid instructions on this label).
P330	Rinse mouth.
P363	Wash contaminated clothing before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_6H_6Cl_6$
Molecular weight	:	290.83 g/mol
CAS-No.	:	319-85-7
EC-No.	:	206-271-3
Index-No.	:	602-042-00-0

Hazardous components

Component	Classification	Concentration
(1α,2β,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane		
	Acute Tox. 3; Acute Tox. 4; Carc. 2; Aquatic Acute 1; Aquatic Chronic 1; H301, H312, H351, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	> 300.0 °C (> 572.0 °F)
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	insoluble
o)	Partition coefficient: n-	log Pow: 3.78

	octanol/water	
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 6,000 mg/kg

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC: 2B - Group 2B: Possibly carcinogenic to humans ((1α,2β,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: Reasonably anticipated to be a human carcinogen ((1α,2β,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: GV4375000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Blood -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Poecilia reticulata (guppy) - 1.6 mg/l - 96.0 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Cyprinus carpio (Carp) - 35 d - 0.05 mg/l
	Bioconcentration factor (BCF): 500

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. ((1α,2β,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)
Reportable Quantity (RQ): 1 lbs
Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG

UN number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. ((1α,2β,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)

IATA

UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. ((1α,2β,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. (1α,2β,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane	CAS-No. 319-85-7	Revision Date 2009-02-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H301	Toxic if swallowed.
H312	Harmful in contact with skin.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	1
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.6 Revision Date: 05/23/2016 Print Date: 06/22/2017

SAFETY DATA SHEET

Version 5.2
Revision Date 06/27/2014
Print Date 07/04/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Endosulfan II (beta)

Product Number : 48578
Brand : Supelco

CAS-No. : 33213-65-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H301 Toxic if swallowed.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P273 Avoid release to the environment.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P321 Specific treatment (see supplemental first aid instructions on this label).
P330 Rinse mouth.
P391 Collect spillage.
P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : β-Endosulfan

Formula : C9H6Cl6O3S
Molecular Weight : 406.93 g/mol
CAS-No. : 33213-65-9

Hazardous components

Component	Classification	Concentration
β-Endosulfan		
	Acute Tox. 3; Aquatic Acute 1; Aquatic Chronic 1; H301, H410	-

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Sulphur oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.Normal measures for preventive fire protection.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	no data available
c)	Odour Threshold	no data available
d)	pH	no data available
e)	Melting point/freezing point	no data available
f)	Initial boiling point and boiling range	no data available
g)	Flash point	no data available
h)	Evapouration rate	no data available
i)	Flammability (solid, gas)	no data available
j)	Upper/lower flammability or explosive limits	no data available
k)	Vapour pressure	no data available
l)	Vapour density	no data available
m)	Relative density	no data available
n)	Water solubility	no data available
o)	Partition coefficient: n-octanol/water	no data available
p)	Auto-ignition temperature	no data available
q)	Decomposition temperature	no data available
r)	Viscosity	no data available
s)	Explosive properties	no data available
t)	Oxidizing properties	no data available

9.2 Other safety information
no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - rat - 240.0 mg/kg

Inhalation: no data available

Dermal: no data available

no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: RB9875200

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Kidney -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - other fish - 0.0066 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - > 0.1 - < 1 mg/l - 48 h

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
Bioaccumulation other fish - 21 d
- 0.0001 mg/l

Bioconcentration factor (BCF): 9,908

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (β-Endosulfan)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: Marine pollutant
Poison Inhalation Hazard: No

IMDG
UN number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (β-Endosulfan)
Marine pollutant: No

IATA
UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (β-Endosulfan)

15. REGULATORY INFORMATION

SARA 302 Components

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
β-Endosulfan	33213-65-9	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
β-Endosulfan	33213-65-9	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
β-Endosulfan	33213-65-9	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H301	Toxic if swallowed.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.2 Revision Date: 06/27/2014 Print Date: 07/04/2016

SAFETY DATA SHEET

Version 5.11
Revision Date 06/18/2015
Print Date 02/11/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Bis(2-ethylhexyl) phthalate

Product Number : 80030
Brand : Sigma-Aldrich
Index-No. : 607-317-00-9

CAS-No. : 117-81-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Reproductive toxicity (Category 1B), H360

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H360 May damage fertility or the unborn child.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P281 Use personal protective equipment as required.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P405 Store locked up.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Endocrine disrupting chemical(s)

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	'Dioctyl' phthalate Phthalic acid bis(2-ethylhexyl ester) DEHP
Formula	:	$C_{24}H_{38}O_4$
Molecular weight	:	390.56 g/mol
CAS-No.	:	117-81-7
EC-No.	:	204-211-0
Index-No.	:	607-317-00-9
Registration number	:	01-2119484611-38-XXXX

Hazardous components

Component	Classification	Concentration
bis(2-Ethylhexyl) phthalate Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)		
	Repr. 1B; H360	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
bis(2-Ethylhexyl) phthalate	117-81-7	TWA	5.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Lower Respiratory Tract irritation Confirmed animal carcinogen with unknown relevance to humans		
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm
Break through time: 480 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 230 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	-50.0 °C (-58.0 °F)
f)	Initial boiling point and boiling range	386 °C (727 °F) - lit.
g)	Flash point	207.0 °C (404.6 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Lower explosion limit: 0.3 %(V)
k)	Vapour pressure	1.6 hPa (1.2 mmHg) at 93.0 °C (199.4 °F)
l)	Vapour density	No data available
m)	Relative density	0.985 g/cm3 at 20 °C (68 °F)
n)	Water solubility	insoluble

o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	390.0 °C (734.0 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 30,000 mg/kg

Inhalation: No data available

LD50 Dermal - Rabbit - 25,000 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Mild skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation - 24 h

Respiratory or skin sensitisation
Maximisation Test (GPMT) - Guinea pig
Result: Does not cause skin sensitisation.
(OECD Test Guideline 406)

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (bis(2-Ethylhexyl) phthalate)

NTP: Reasonably anticipated to be a human carcinogen (bis(2-Ethylhexyl) phthalate)

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
May cause congenital malformation in the fetus.
Presumed human reproductive toxicant

May cause reproductive disorders.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: TI0350000

Effects due to ingestion may include:, Gastrointestinal disturbance

Kidney -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - > 0.67 mg/l - 96 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - > 0.32 mg/l - 96 h
	LC50 - Cyprinodon variegatus (sheepshead minnow) - > 0.17 mg/l - 96 h
	LC50 - Lepomis macrochirus (Bluegill) - > 0.20 mg/l - 96 h
	NOEC - other fish - > 0.3 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - > 0.16 mg/l - 48 h

12.2 Persistence and degradability

Biodegradability	Result: - Readily biodegradable (OECD Test Guideline 301)

12.3 Bioaccumulative potential

Bioaccumulation	Oncorhynchus mykiss (rainbow trout) - 100 d - 0.014 mg/l Bioconcentration factor (BCF): 113 Remarks: Does not bioaccumulate.

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3082 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, liquid, n.o.s. (bis(2-Ethylhexyl) phthalate)
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
bis(2-Ethylhexyl) phthalate	117-81-7	2007-07-01

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
bis(2-Ethylhexyl) phthalate	117-81-7	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
bis(2-Ethylhexyl) phthalate	117-81-7	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
bis(2-Ethylhexyl) phthalate	117-81-7	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. bis(2-Ethylhexyl) phthalate	CAS-No. 117-81-7	Revision Date 2009-02-01
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. bis(2-Ethylhexyl) phthalate	CAS-No. 117-81-7	Revision Date 2009-02-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H360	May damage fertility or the unborn child.
Repr.	Reproductive toxicity

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	1
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	1
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.11 Revision Date: 06/18/2015 Print Date: 02/11/2016

Safety Data Sheet
acc. to OSHA HCS

Printing date 03/05/2019 *Reviewed on 03/05/2019*

1 Identification

· **Product identifier**

· **Product Name: BTEX Standard**

· **Part Number:** BTEX
· **Application of the substance / the mixture** Certified Reference Material

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
SPEX CertiPrep, LLC.
203 Norcross Ave, Metuchen,
NJ 08840 USA

· **Information department:** product safety department
· **Emergency telephone number:**
Emergency Phone Number (24 hours)
CHEMTREC (800-424-9300)
Outside US: 703-527-3887

2 Hazard(s) identification

· **Classification of the substance or mixture**



GHS02 Flame

Flam. Liq. 2 H225 Highly flammable liquid and vapor.



GHS06 Skull and crossbones

Acute Tox. 3 H331 Toxic if inhaled.



GHS08 Health hazard

STOT SE 1 H370 Causes damage to organs.

· **Label elements**
· **GHS label elements** The product is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms**



GHS02 GHS06 GHS08

· **Signal word** Danger

· **Hazard-determining components of labeling:**
methanol
· **Hazard statements**
H225 Highly flammable liquid and vapor.
H331 Toxic if inhaled.
H370 Causes damage to organs.
· **Precautionary statements**
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Use explosion-proof electrical/ventilating/lighting/equipment.
Do not breathe dust/fume/gas/mist/vapors/spray.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
Store locked up.
Dispose of contents/container in accordance with local/regional/national/international regulations.
· **Classification system:**
· **NFPA ratings (scale 0 - 4)**



Health = 1
Fire = 3
Reactivity = 0

(Contd. on page 2)

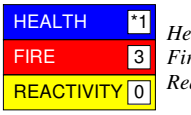
Safety Data Sheet
acc. to OSHA HCS

Printing date 03/05/2019 Reviewed on 03/05/2019

Product Name: BTEX Standard

(Contd. of page 1)

· **HMIS-ratings (scale 0 - 4)**



*Health = *1*
Fire = 3
Reactivity = 0

· **Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

3 Composition/information on ingredients

· **Chemical characterization: Mixtures**
· **Description:** Mixture of the substances listed below with nonhazardous additions.

· **Dangerous components:**		
67-56-1	methanol	99.88%

· **Chemical identification of the substance/preparation**		
71-43-2	benzene	0.02%
95-47-6	o-xylene	0.02%
106-42-3	p-xylene	0.02%
108-88-3	toluene	0.02%
100-41-4	ethylbenzene	0.02%
108-38-3	m-xylene	0.02%

4 First-aid measures

· **Description of first aid measures**
· **General information:**
Immediately remove any clothing soiled by the product.
Remove breathing apparatus only after contaminated clothing have been completely removed.
In case of irregular breathing or respiratory arrest provide artificial respiration.
· **After inhalation:**
Supply fresh air or oxygen; call for doctor.
In case of unconsciousness place patient stably in side position for transportation.
· **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
· **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
· **After swallowing:** Do not give anything to eat or drink - Do not induce vomitting
· **Information for Doctor:**
· **Most important symptoms and effects, both acute and delayed** No further relevant information available.
· **Indication of any immediate medical attention and special treatment needed** No further relevant information available.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:** CO2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
· **Special hazards arising from the substance or mixture** During heating or in case of fire poisonous gases are produced.
· **Advice for firefighters**
· **Protective equipment:** Mouth respiratory protective device.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures**
Mount respiratory protective device.
Wear protective equipment. Keep unprotected persons away.
· **Environmental precautions:**
Dilute with plenty of water.
Do not allow to enter sewers/ surface or ground water.
· **Methods and material for containment and cleaning up:**
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.

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Safety Data Sheet
acc. to OSHA HCS

Product Name: BTEX Standard

(Contd. of page 2)

· **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
· **Protective Action Criteria for Chemicals**

· **PAC-1:**		
67-56-1	methanol	530 ppm
71-43-2	benzene	52 ppm
108-88-3	toluene	67 ppm
100-41-4	ethylbenzene	33 ppm
108-38-3	m-xylene	130 ppm

· **PAC-2:**		
67-56-1	methanol	2,100 ppm
71-43-2	benzene	800 ppm
108-88-3	toluene	560 ppm
100-41-4	ethylbenzene	1100* ppm
108-38-3	m-xylene	920 ppm

· **PAC-3:**		
67-56-1	methanol	7200* ppm
71-43-2	benzene	4000* ppm
108-88-3	toluene	3700* ppm
100-41-4	ethylbenzene	1800* ppm
108-38-3	m-xylene	2500* ppm

7 Handling and storage

· **Handling:**
· **Precautions for safe handling**
Ensure good ventilation/exhaustion at the workplace.
Open and handle receptacle with care.
Prevent formation of aerosols.
· **Information about protection against explosions and fires:**
Keep ignition sources away - Do not smoke.
Protect against electrostatic charges.
Keep respiratory protective device available.

· **Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** Store in a cool location.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:**
Keep receptacle tightly sealed.
Store in cool, dry conditions in well sealed receptacles.
· **Specific end use(s)** No further relevant information available.

8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see item 7.

· **Control parameters**

· **Components with limit values that require monitoring at the workplace:**	
67-56-1 methanol	
PEL	Long-term value: 260 mg/m³, 200 ppm
REL	Short-term value: 325 mg/m³, 250 ppm Long-term value: 260 mg/m³, 200 ppm Skin
TLV	Short-term value: 328 mg/m³, 250 ppm Long-term value: 262 mg/m³, 200 ppm Skin; BEI

(Contd. on page 4)

Safety Data Sheet
acc. to OSHA HCS

Product Name: BTEX Standard

(Contd. of page 3)

· **Ingredients with biological limit values:**

67-56-1 methanol

BEI 15 mg/L
Medium: urine
Time: end of shift
Parameter: Methanol (background, nonspecific)

· **Additional information:** The lists that were valid during the creation were used as basis.

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
· **Respiratory protection:**
In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.
· **Protection of hands:**



Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation
· **Material of gloves**
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.
· **Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
· **Eye protection:**



Tightly sealed goggles

9 Physical and chemical properties

· **Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Liquid
Color:	According to product specification
· **Odor:**	Characteristic
· **Odour Threshold:**	Not applicable.
· **pH-value:**	Not applicable.
· **Change in condition**	
Melting point/Melting range:	Undetermined.
Boiling point/Boiling range:	64.7 °C (148.5 °F)
· **Flash point:**	< 23 °C (<73.4 °F)
· **Flammability (solid, gaseous):**	Not applicable.
· **Ignition temperature:**	455 °C (851 °F)
· **Decomposition temperature:**	Not applicable.
· **Auto igniting:**	Product is not selfigniting.
· **Danger of explosion:**	Product is not explosive. However, formation of explosive air/vapor mixtures are possible.
· **Explosion limits:**	
Lower:	5.5 Vol %
Upper:	44 Vol %

(Contd. on page 5)

Safety Data Sheet
acc. to OSHA HCS

Product Name: BTEX Standard

(Contd. of page 4)

· **Vapor pressure at 20 °C (68 °F):**	128 hPa (96 mm Hg)
· **Density at 20 °C (68 °F)**	0.79009 g/cm³ (6.5933 lbs/gal)
· **Relative density**	Not applicable.
· **Vapor density**	Not applicable.
· **Evaporation rate**	Not applicable.
· **Solubility in / Miscibility with**	
Water:	Fully miscible.
· **Partition coefficient (n-octanol/water):**	Not applicable.
· **Viscosity:**	
Dynamic:	Not applicable.
Kinematic:	Not applicable.
· **Solvent content:**	
Organic solvents:	100.0 %
VOC content:	100.00 %
Solids content:	0.0 %
· **Other information**	No further relevant information available.

10 Stability and reactivity

· **Reactivity** No further relevant information available.
· **Chemical stability**
· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
· **Possibility of hazardous reactions** No dangerous reactions known.
· **Conditions to avoid** No further relevant information available.
· **Incompatible materials:** No further relevant information available.
· **Hazardous decomposition products:** No dangerous decomposition products known.

11 Toxicological information

· **Information on toxicological effects**
· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**

67-56-1 methanol

Oral	LD50	5,628 mg/kg (rat)
Dermal	LD50	15,800 mg/kg (rabbit)

· **Primary irritant effect:**
· **on the eye:** No irritating effect.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**
The product shows the following dangers according to internally approved calculation methods for preparations:
Toxic

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**

71-43-2	benzene	1
95-47-6	o-xylene	3
106-42-3	p-xylene	3
108-88-3	toluene	3
100-41-4	ethylbenzene	2B
108-38-3	m-xylene	3

· **NTP (National Toxicology Program)**

71-43-2	benzene	K

· **OSHA-Ca (Occupational Safety & Health Administration)**

71-43-2	benzene

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Safety Data Sheet
acc. to OSHA HCS

Product Name: BTEX Standard

(Contd. of page 5)

12 Ecological information

· **Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **Persistence and degradability** No further relevant information available.
· **Behavior in environmental systems:**
· **Bioaccumulative potential** No further relevant information available.
· **Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Water hazard class 1 (Self-assessment): slightly hazardous for water
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:** Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

· **Uncleaned packagings:**
· **Recommendation:** Disposal must be made according to official regulations.
· **Recommended cleansing agent:** Water, if necessary with cleansing agents.

14 Transport information

· **UN-Number**	
· **DOT, ADR, IMDG, IATA**	UN1230
· **UN proper shipping name**	
· **DOT**	Methanol
· **ADR**	1230 METHANOL
· **IMDG, IATA**	METHANOL
· **Transport hazard class(es)**	
· **DOT**	
· **Class**	3 Flammable liquids
· **Label**	3, 6.1
· **ADR**	
· **Class**	3 Flammable liquids
· **Label**	3+6.1
· **IMDG**	
· **Class**	3 Flammable liquids

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Safety Data Sheet
acc. to OSHA HCS

Product Name: BTEX Standard

(Contd. of page 6)

· **Label**	3/6.1
· **IATA**	
	
· **Class**	3 Flammable liquids
· **Label**	3 (6.1)
· **Packing group**	
· **DOT, ADR, IMDG, IATA**	II
· **Environmental hazards:**	Not applicable.
· **Special precautions for user**	Warning: Flammable liquids
· **Danger code (Kemler):**	336
· **EMS Number:**	F-E,S-D
· **Stowage Category**	B
· **Stowage Code**	SW2 Clear of living quarters.
· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **Transport/Additional information:**	
· **ADR**	
· **Excepted quantities (EQ)**	Code: E2 Maximum net quantity per inner packaging: 30 ml Maximum net quantity per outer packaging: 500 ml
· **IMDG**	
· **Limited quantities (LQ)**	1L
· **Excepted quantities (EQ)**	Code: E2 Maximum net quantity per inner packaging: 30 ml Maximum net quantity per outer packaging: 500 ml
· **UN "Model Regulation":**	UN 1230 METHANOL, 3 (6.1), II

15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **Sara**

· **Section 313 (Specific toxic chemical listings):**
All ingredients are listed.

· **TSCA (Toxic Substances Control Act):**
All ingredients are listed.

· **Proposition 65**

· **Chemicals known to cause cancer:**

71-43-2	benzene
100-41-4	ethylbenzene

· **Chemicals known to cause reproductive toxicity for females:**
None of the ingredients is listed.

· **Chemicals known to cause reproductive toxicity for males:**

71-43-2	benzene

· **Chemicals known to cause developmental toxicity:**

67-56-1	methanol
71-43-2	benzene
108-88-3	toluene

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**

71-43-2	benzene	A, K/L
95-47-6	o-xylene	I
106-42-3	p-xylene	I
108-88-3	toluene	II

(Contd. on page 8)

Safety Data Sheet
acc. to OSHA HCS

Product Name: BTEX Standard

(Contd. of page 7)

100-41-4	ethylbenzene	D
108-38-3	m-xylene	I

· **TLV (Threshold Limit Value established by ACGIH)**

71-43-2	benzene	A1
95-47-6	o-xylene	A4
106-42-3	p-xylene	A4
108-88-3	toluene	A4
100-41-4	ethylbenzene	A3
108-38-3	m-xylene	A4

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**

71-43-2	benzene

· **GHS label elements** The product is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms**



GHS02 GHS06 GHS08

· **Signal word** Danger

· **Hazard-determining components of labeling:**
methanol
· **Hazard statements**
H225 Highly flammable liquid and vapor.
H331 Toxic if inhaled.
H370 Causes damage to organs.
· **Precautionary statements**
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Use explosion-proof electrical/ventilating/lighting/equipment.
Do not breathe dust/fume/gas/mist/vapors/spray.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
Store locked up.
Dispose of contents/container in accordance with local/regional/national/international regulations.
· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Department issuing SDS:** product safety department
· **Contact:**
SPEX CertiPrep, LLC.
1-732-549-7144
· **Date of preparation / last revision** 03/05/2019 / -
· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
VOC: Volatile Organic Compounds (USA, EU)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety & Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
BEI: Biological Exposure Limit
Flam. Liq. 2: Flammable liquids – Category 2
Acute Tox. 3: Acute toxicity – Category 3
STOT SE 1: Specific target organ toxicity (single exposure) – Category 1

SAFETY DATA SHEET

Revision Date 24-Dec-2021 **Revision Number** 4

1. Identification

Product Name **Cadmium**

Cat No. : **C3-500**

CAS No 7440-43-9
Synonyms No information available

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable solids	Category 2
Acute oral toxicity	Category 4
Acute dermal toxicity	Category 4
Acute Inhalation Toxicity - Dusts and Mists	Category 2
Germ Cell Mutagenicity	Category 2
Carcinogenicity	Category 1A
Reproductive Toxicity	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	
Specific target organ toxicity - (repeated exposure)	Category 1
Target Organs - Kidney, Blood.	
Combustible dust	Yes

Label Elements

Signal Word

Danger

Hazard Statements
Flammable solid
May form combustible dust concentrations in air
Fatal if inhaled
Harmful if swallowed
Harmful in contact with skin
May cause respiratory irritation
Suspected of causing genetic defects
May cause cancer
Suspected of damaging fertility. Suspected of damaging the unborn child
Causes damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting equipment
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Immediately call a POISON CENTER or doctor/physician
Skin
IF ON SKIN: Wash with plenty of soap and water
Wash contaminated clothing before reuse
Call a POISON CENTER or doctor/physician if you feel unwell
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Fire
Fight fire with normal precautions from a reasonable distance
Evacuate area
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
WARNING. Cancer and Reproductive Harm - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Cadmium	7440-43-9	100

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately.

Most important symptoms and effects None reasonably foreseeable. . Kidney disorders: May cause harm to the unborn child: Blood disorders

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available

Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Fine dust dispersed in air may ignite. Dust can form an explosive mixture with air. Pyrophoric properties of solids and liquids. Do not allow run-off from fire-fighting to enter drains or water courses.

Hazardous Combustion Products
Toxic fumes.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
4	1	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment as required. Avoid dust

formation. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas.

Environmental Precautions Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained.

Methods for Containment and Clean Up Sweep up and shovel into suitable containers for disposal. Avoid dust formation.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Avoid dust formation. Use only under a chemical fume hood. Do not breathe (dust, vapor, mist, gas). Do not ingest. If swallowed then seek immediate medical assistance.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Store under an inert atmosphere. Incompatible Materials. Strong oxidizing agents. Strong acids. Sulfur oxides.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Cadmium	TWA: 0.01 mg/m³ TWA: 0.002 mg/m³	Ceiling: 0.3 mg/m³ Ceiling: 0.6 mg/m³ (Vacated) STEL: 0.3 ppm TWA: 0.1 mg/m³ TWA: 0.2 mg/m³ TWA: 5 µg/m³	IDLH: 9 mg/m³	TWA: 0.01 mg/m³ TWA: 0.002 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures When using do not eat, drink or smoke. Provide regular cleaning of equipment, work area and clothing. Avoid contact with skin, eyes or clothing. Wash hands before breaks and immediately after handling the product. Keep away from food, drink and animal feeding stuffs.

9. Physical and chemical properties

Physical State Solid

Appearance	Silver
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	321 °C / 609.8 °F
Boiling Point/Range	765 °C / 1409 °F @ 760 mmHg
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	Not applicable
Specific Gravity	8.64 @ 25°C
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Cd
Molecular Weight	112.40

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under recommended storage conditions. Moisture sensitive. Air sensitive.

Conditions to Avoid Incompatible products. Excess heat. Avoid dust formation. Exposure to air or moisture over prolonged periods.

Incompatible Materials Strong oxidizing agents, Strong acids, Sulfur oxides

Hazardous Decomposition Products Toxic fumes

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Cadmium	LD50 = 2330 mg/kg (Rat)	Not listed	LC50 = 25 mg/m³ (Rat) 30 min

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Cadmium	7440-43-9	Group 1	Known	A2	X	A2

IARC (International Agency for Research on Cancer)	*IARC (International Agency for Research on Cancer)* *Group 1 - Carcinogenic to Humans* *Group 2A - Probably Carcinogenic to Humans* *Group 2B - Possibly Carcinogenic to Humans*
NTP: (National Toxicity Program)	*NTP: (National Toxicity Program)* *Known - Known Carcinogen* *Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen*
ACGIH: (American Conference of Governmental Industrial Hygienists)	*A1 - Known Human Carcinogen* *A2 - Suspected Human Carcinogen* *A3 - Animal Carcinogen* *ACGIH: (American Conference of Governmental Industrial Hygienists)*

Mutagenic Effects Possible risk of irreversible effects

Reproductive Effects Possible risk of impaired fertility. May cause harm to the unborn child.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system
STOT - repeated exposure Kidney Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Kidney disorders: May cause harm to the unborn child: Blood disorders

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information



Ecotoxicity

The product contains following substances which are hazardous for the environment. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Cadmium	Not listed	LC50: 0.0004 - 0.003 mg/L, 96h (Pimephales promelas) LC50: = 0.016 mg/L, 96h (Oryzias latipes) LC50: = 21.1 mg/L, 96h flow-through (Lepomis macrochirus) LC50: = 0.24 mg/L, 96h static (Cyprinus carpio) LC50: = 4.26 mg/L, 96h semi-static (Cyprinus carpio) LC50: = 0.002 mg/L, 96h	Not listed	EC50: = 0.0244 mg/L, 48h Static (Daphnia magna)

		(Cyprinus carpio) LC50: = 0.006 mg/L, 96h static (Oncorhynchus mykiss) LC50: = 0.003 mg/L, 96h flow-through (Oncorhynchus mykiss)		

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility No information available.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No	UN2930
Proper Shipping Name	Toxic solid, flammable, organic, n.o.s.
Technical Name	Cadmium
Hazard Class	6.1
Subsidiary Hazard Class	4.1
Packing Group	I

TDG

UN-No	UN2930
Proper Shipping Name	Toxic solid, flammable, organic, n.o.s.
Hazard Class	6.1
Subsidiary Hazard Class	4.1
Packing Group	I

IATA

UN-No	UN2930
Proper Shipping Name	Toxic solid, flammable, organic, n.o.s.
Hazard Class	6.1
Subsidiary Hazard Class	4.1
Packing Group	I

IMDG/IMO

UN-No	UN2930
Proper Shipping Name	Toxic solid, flammable, organic, n.o.s.
Hazard Class	6.1
Subsidiary Hazard Class	4.1
Packing Group	I

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Cadmium	7440-43-9	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories

Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Cadmium	7440-43-9	X	-	231-152-8	X	X		X	X	KE-04397

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Cadmium	7440-43-9	100	0.1

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Cadmium	-	-	X	X

Clean Air Act

OSHA - Occupational Safety and Health Administration Not applicable

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Cadmium	5 µg/m³ TWA 2.5 µg/m³ Action Level	-

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Cadmium	10 lb	-

California Proposition 65 This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
Cadmium	7440-43-9	Carcinogen Developmental Male Reproductive	0.05 µg/day	Developmental Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Cadmium	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Cadmium	-	Use restricted. See item 72. (see link for restriction details) Use restricted. See item 23. (see link for restriction details) Use restricted. See item 28. (see link for restriction details) Use restricted. See item 75. (see link for restriction details)	SVHC Candidate list - 231-152-8 - Carcinogenic, Article 57a;Specific target organ toxicity after repeated exposure, Article 57(f) - human health

After the sunset date the use of this substance requires either an authorization or can only be used for exempted uses, e.g. use in scientific research and development which includes routine analytics or use as intermediate.

https://echa.europa.eu/authorisation-list
https://echa.europa.eu/substances-restricted-under-reach
https://echa.europa.eu/candidate-list-table

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Cadmium	7440-43-9	Listed	Not applicable	Not applicable	0.01% (Max. Conc.)

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Cadmium	7440-43-9	Not applicable	Not applicable	Not applicable	Annex I - Y26

16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Revision Date 24-Dec-2021
Print Date 24-Dec-2021
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SECTION 1: Identification of the substance/mixture and of the company/ undertaking

1.1 Product identifier

Calcium metal, granular (102780)

Calcium metal, granular ; CAS No. : 7440-70-2 ; EC No. : 231-179-5 ; Index No. : 020-001-00-X ; REACH No. : 01-2119516038-45-XXXX

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses

For manufacturing, processing, laboratory or repacking use only.

Uses advised against

Uses other than those recommended.

1.3 Details of the supplier of the safety data sheet

Supplier (manufacturer/importer/only representative/downstream user/distributor)

DC Fine Chemicals Ltd

Street : 88 Hill Top

Postal code/City : NW11 6DY London United Kingdom

Telephone : +44 (0)20 7586 6800

Telefax : +44 (0)20 7504 1701

Information contact : info@dcfinechemicals.com

1.4 Emergency telephone number

(Only available during office hours; Monday-Friday; 08:00-18:00)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [CLP]

Water-react. 2 ; H261 - Substances or mixtures which, in contact with water, emit flammable gases : Category 2 ; In contact with water releases flammable gases.

2.2 Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms



Flame (GHS02)

Signal word

DANGER

Hazard statements

H261 In contact with water releases flammable gases.

Precautionary statements

P223	Do not allow contact with water.
P231+P232	Handle and store contents under inert gas. Protect from moisture.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P302+P335+P334	IF ON SKIN: Brush off loose particles from skin. Immerse in cool water [or wrap in wet bandages].
P370+P378	In case of fire: Use ... to extinguish.
P402+P404	Store in a dry place. Store in a closed container.

2.3 Other hazards

None

SECTION 3: Composition/information on ingredients

3.1 Substances

Substance name : Calcium metal, granular

Index No. : 020-001-00-X

EC No. : 231-179-5

REACH No. : 01-2119516038-45-XXXX

CAS No. : 7440-70-2

Purity : 100 % [mass]

SECTION 4: First aid measures

4.1 Description of first aid measures

Remove contaminated, saturated clothing immediately. After contact with skin, wash immediately with plenty of water and soap. After contact with the eyes, rinse with water with the eyelids open for a sufficient length of time, then consult an ophthalmologist immediately. Remove victim out of the danger area. When in doubt or if symptoms are observed, get medical advice.

4.2 Most important symptoms and effects, both acute and delayed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person or a person with cramps.

4.3 Indication of any immediate medical attention and special treatment needed

In case of doubt or when symptoms of feeling unwell persist, get medical attention. Never administer anything orally to persons who are unconscious.

SECTION 5: Firefighting measures

The product is Highly inflammable, it can cause or considerably worsen a fire, the necessary prevention measures should be taken and risks avoided. In case of fire, the following measures are recommended:

5.1 Extinguishing media

Suitable extinguishing media

Extinguisher powder or CO2. In case of more serious fires, also alcohol-resistant foam and water spray.

Unsuitable extinguishing media

Do not use a direct stream of water to extinguish. In the presence of electrical voltage, you cannot use water or foam as extinguishing media.

5.2 Special hazards arising from the substance or mixture

In case of fire may be liberated: Pyrolysis products, toxic

5.3 Advice for firefighters

Wear a self-contained breathing apparatus and chemical protective clothing. Do not inhale explosion and combustion gases. In case of fire: Wear self-contained breathing apparatus.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Wear a self-contained breathing apparatus and chemical protective clothing.

For emergency responders

Eliminate possible ignition points and ventilate the area. No smoking. Avoid breathing fumes.For exposure control and individual protection measures, see section 8.

6.2 Environmental precautions

Do not allow to enter into surface water or drains. In case of gas escape or of entry into waterways, soil or drains, inform the responsible authorities. Retain contaminated washing water and dispose it.

6.3 Methods and material for containment and cleaning up

For containment

Collect in closed and suitable containers for disposal.

For cleaning up

The contaminated area should be cleaned up immediately with: Water Soak up inert absorbent and dispose as waste requiring special attention. Absorb with liquid-binding material (sand, diatomaceous earth, acid- or universal binding agents). Avoid dust formation. Clear spills immediately.

6.4 Reference to other sections

Reference to other sections Disposal: see section 13 Personal protection equipment: see section 8

SECTION 7: Handling and storage

7.1 Precautions for safe handling

In case of insufficient ventilation and/or through use, explosive/highly flammable mixtures may develop.

Protective measures



When using do not eat, drink, smoke, sniff. Wear personal protection equipment (refer to section 8).

Measures to prevent aerosol and dust generation

Vapours can form explosive mixtures with air. Take precautionary measures against static discharges. Use only in well-ventilated areas. Do not breathe gas/fumes/vapour/spray. Do not breathe dust.

Environmental precautions

Use appropriate container to avoid environmental contamination.

Specific requirements or handling rules

Handle and open container with care.

Advices on general occupational hygiene

Take care for general good hygiene and housekeeping.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures and storage conditions

Storage temperature :
Keep in a cool, well-ventilated place. Keep away from sources of ignition - No smoking.

Requirements for storage rooms and vessels

Only use containers specifically approved for the substance/product.

Hints on joint storage

Store at least 3 metres apart from: Chemicals/products that react together readily Protect against Humidity. UV-radiation/sunlight

Storage class (TRGS 510) : 4.3

7.3 Specific end use(s)

None

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

None

8.2 Exposure controls

Only wear fitting, comfortable and clean protective clothing.

Personal protection equipment

Eye/face protection



Eye glasses with side protection Face protection shield EN 166

Skin protection

Hand protection



Tested protective gloves must be worn EN ISO 374

Body protection

For the protection against direct skin contact, body protective clothing is essential (in addition to the usual working clothes). Wear anti-static footwear and clothing Wash contaminated clothing prior to re-use.



Respiratory protection

If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.



Particle filter device (EN 143).

Thermal hazards

No special measures are necessary.

Environmental exposure controls

No information available.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance : solid

Safety characteristics

Melting point/freezing point :	(1013 hPa)	850	°C	
Initial boiling point and boiling range :	(1013 hPa)	1175	°C	
Decomposition temperature :	(1013 hPa)	No data available		
Flash point :		No data available		
Auto-ignition temperature :		No data available		
Lower explosion limit :		No data available		
Upper explosion limit :		No data available		
Vapour pressure :	(50 °C)	No data available		
Density :	(20 °C)	No data available		
Solvent separation test :	(20 °C)	not applicable		
Water solubility :	(20 °C)	4	g/l	
Fat solubility :	(20 °C)	No data available.		
pH :		14		
log P O/W :		No data available		
Flow time :	(20 °C)	No data available		DIN-cup 4 mm
Viscosity :	(20 °C)	No data available		
Relative vapour density :	(20 °C)	No data available		
Evaporation rate :		No data available		
Flammable solids :	No data available.			
Flammable gases :	No data available.			
Explosive properties :	No data available.			

9.2 Other information

None

SECTION 10: Stability and reactivity

10.1 Reactivity

The product does not present hazards by their reactivity.

10.2 Chemical stability

The product is chemically stable under recommended conditions of storage, use and temperature. Safe handling: see

section 7

10.3 Possibility of hazardous reactions
The product does not present possibility of hazardous reactions.

10.4 Conditions to avoid
Avoid any improper handling.

10.5 Incompatible materials
Keep away from oxidising agents and from highly alkaline or acidic materials in order to prevent exothermic reactions.

10.6 Hazardous decomposition products
In case of fire may be liberated: Hazardous combustion products

SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008
Acute toxicity
No information available.
Corrosion
Skin corrosion/irritation
No information available.
Serious eye damage/eye irritation
No information available.
Respiratory or skin sensitisation
No information available.
CMR effects (carcinogenicity, mutagenicity and toxicity for reproduction)
Carcinogenicity
No information available.
Germ cell mutagenicity
No information available.
Reproductive toxicity
No information available.
STOT-single exposure
No information available.
STOT-repeated exposure
No information available.
Aspiration hazard
No information available.

11.2 Information on other hazards
No information available.

SECTION 12: Ecological information

12.1 Toxicity
Aquatic toxicity
Acute (short-term) toxicity to crustacea

Parameter :	EC50 (Calcium metal, granular ; CAS No. : 7440-70-2)
Species :	Daphnia magna (Big water flea)
Evaluation parameter :	Acute (short-term) toxicity to crustacea
Effective dose :	330 mg/l
Exposure time :	48 hour(s)

12.2 Persistence and degradability
No information available.

12.3 Bioaccumulative potential
No information available.

12.4 Mobility in soil
No information available.

12.5 Results of PBT and vPvB assessment
This substance does not meet the PBT/vPvB criteria of REACH, Annex XIII.

12.6 Endocrine disrupting properties
No information available.

12.7 Other adverse effects
No information available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
The allocation of waste identity numbers/waste descriptions must be carried out according to the EEC, specific to the industry and process. Do not dump into sewers or waterways. Waste and empty containers must be handled and eliminated according to current, local/national legislation. Follow the provisions of Directive 2008/98/EC regarding waste management.

Product/Packaging disposal
Waste treatment options
Recycle according to official regulations. Evidence for disposal must be provided.

Appropriate disposal / Product
Dispose of waste according to applicable legislation.

Appropriate disposal / Package
Non-contaminated packages must be recycled or disposed of. Contaminated packages must be completely emptied and can be re-used following proper cleaning. Packing which cannot be properly cleaned must be disposed of. Handle contaminated packages in the same way as the substance itself.

SECTION 14: Transport information

14.1 UN number
UN 1401

14.2 UN proper shipping name
Land transport (ADR/RID)
CALCIUM

Sea transport (IMDG)
CALCIUM

Air transport (ICAO-TI / IATA-DGR)

CALCIUM

14.3 Transport hazard class(es)

Land transport (ADR/RID)

Class(es) :	4.3
Classification code :	W2
Hazard identification number (Kemler No.) :	423
Tunnel restriction code :	D/E
Special provisions :	LQ 500 g · E 2
Hazard label(s) :	4.3

Sea transport (IMDG)

Class(es) :	4.3
EmS-No. :	F-G / S-O
Special provisions :	LQ 500 g · E 2 · IMDG-Code segregation group 26 · IMDG-Code segregation group 35
Hazard label(s) :	4.3

Air transport (ICAO-TI / IATA-DGR)

Class(es) :	4.3
Special provisions :	E 2
Hazard label(s) :	4.3

14.4 Packing group

II

14.5 Environmental hazards

Land transport (ADR/RID) : No
Sea transport (IMDG) : No
Air transport (ICAO-TI / IATA-DGR) : No

14.6 Special precautions for user

Hazard label(s) :



14.7 Transport in bulk according to Annex II of Marpol and the IBC Code

No information available.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Safety Data Sheet according to Regulation (EC) No. 1907/2006 (REACH) Classification according to Regulation (EC) No 1272/2008 [CLP] according to Regulation (EU) No. 2020/878

EU legislation

Authorisations and/or restrictions on use

Restrictions on use

Regulation (EC) No. 1907/2006 (REACH), Annex XVII (restrictions)

Use restriction according to REACH annex XVII, no. : 3

National regulations
Water hazard class
Class : nwg (Non-hazardous to water)

15.2 Chemical Safety Assessment
No information available.

SECTION 16: Other information

16.1 Indication of changes
None

16.2 Abbreviations and acronyms

ADR:	European Agreement concerning the International Carriage of Dangerous Goods by Road
ASTM:	ASTM International, originally known as American Society for Testing and Materials (ASTM)
EINECS:	European Inventory of Existing Commercial Chemical Substances
EC50:	Effective Concentration 50 (Maximum Effective Concentration for 0% of Individuals)
LC50:	Lethal Concentration 50 (Lethal Concentration for 50% of Individuals)
IC50:	Inhibitor Concentration 50 (Inhibitory Concentration for 50% of Individuals)
NOEL:	No Observed Effect Level (Maximum dose without effect)
DNEL:	Derived No Effect Level (Derived no-effect dose)
DMEL:	Derived Minimum Effect Level (Derived dose of minimal effect)
CLP:	Classification, Labelling and Packaging
CSR:	Chemical Safety Report
LD50:	Lethal Dose 50 (Lethal Dose for 50% of Individuals)
IATA:	International Air Transport Association
ICAO:	International Civil Aviation Organization
Codice IMDG:	International Maritime Dangerous Goods code
PBT:	Persistent, bioaccumulative and toxic
RID:	Regulations concerning the international rail transport of Dangerous Goods
STEL:	Short term exposure limit
TLV:	Threshold limit value
TWA:	Time Weighted Average
UE:	European Union
vPvB:	Very persistent very bioaccumulative
N.D.:	Uvailable
N.A.:	Not applicable
VwVwS.:	Text of Administrative Regulation on the Classification of Substances hazardous to waters into Water Hazard Classes

16.3 Key literature references and sources for data
None

16.4 Relevant H- and EUH-phrases (Number and full text)
H261 In contact with water releases flammable gases.

16.5 Training advice
None

16.6 Additional information
None

The above information describes exclusively the safety requirements of the product and is based on our present-day knowledge. The information is intended to give you advice about the safe handling of the product named in this safety data sheet, for storage, processing, transport and disposal. The information cannot be transferred to other products. In the case of mixing the product with other products or in the case of processing, the information on this safety data sheet is not necessarily valid for the new made-up material.

SAFETY DATA SHEET

Version 3.8
Revision Date 10/12/2015
Print Date 01/29/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Carbazole

Product Number : C5132
Brand : Sigma

CAS-No. : 86-74-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Carcinogenicity (Category 2), H351
Chronic aquatic toxicity (Category 4), H413

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H351 Suspected of causing cancer.
H413 May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P273 Avoid release to the environment.
P281 Use personal protective equipment as required.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P405 Store locked up.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_{12}H_9N$
Molecular weight	:	167.21 g/mol
CAS-No.	:	86-74-8
EC-No.	:	201-696-0

Hazardous components

Component	Classification	Concentration
Carbazole		
	Carc. 2; Aquatic Chronic 4; H351, H413	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Nitrogen oxides (NOx)

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: beige
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 243 - 246 °C (469 - 475 °F)
f)	Initial boiling point and boiling range	355 °C (671 °F)
g)	Flash point	220.0 °C (428.0 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	The product is not flammable.
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	533 hPa (400 mmHg) at 323 °C (613 °F)
l)	Vapour density	No data available
m)	Relative density	1.1 g/cm3 at 18 °C (64 °F)
n)	Water solubility	0.00091 g/l at 25 °C (77 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 3.72 at 22 °C (72 °F)
p)	Auto-ignition temperature	> 600 °C (> 1,112 °F) at 1,013 hPa (760 mmHg)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD0 Oral - Rat - > 16,000 mg/kg
(OECD Test Guideline 401)

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

Carcinogenicity - Mouse - male and female - Oral
hepatocellular carcinoma

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Carbazole)
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: FE3150000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - > 0.93 mg/l - 96.0 h Remarks: No toxicity at the limit of solubility
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 2.30 - 4.90 mg/l - 48 h Remarks: No toxicity at the limit of solubility
Toxicity to algae	Growth inhibition NOEC - Scenedesmus acuminatus - > 0.4 mg/l - 96 h Remarks: No toxicity at the limit of solubility

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Cyprinus carpio (Carp) - 42 d - 0.05 mg/l Bioconcentration factor (BCF): 241 Cyprinus carpio (Carp) - 42 d - 0.005 mg/l Bioconcentration factor (BCF): 200

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Carbazole)
Marine pollutant:yes
IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Carbazole)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Carbazole	86-74-8	2009-07-17

New Jersey Right To Know Components

	CAS-No.	Revision Date
Carbazole	86-74-8	2009-07-17

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Carbazole	86-74-8	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H351	Suspected of causing cancer.
H413	May cause long lasting harmful effects to aquatic life.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0
Health hazard:	2
Fire Hazard:	1
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.8 Revision Date: 10/12/2015 Print Date: 01/29/2016

SAFETY DATA SHEET

Version 5.6
Revision Date 12/10/2015
Print Date 02/09/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Carbon disulfide

Product Number : 180173
Brand : Sigma-Aldrich
Index-No. : 006-003-00-3

CAS-No. : 75-15-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Acute toxicity, Inhalation (Category 4), H332
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Reproductive toxicity (Category 2), H361
Specific target organ toxicity - repeated exposure, Inhalation (Category 1), H372
Acute aquatic toxicity (Category 2), H401

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H225	Highly flammable liquid and vapour.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H361	Suspected of damaging fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure if inhaled.

H401	Toxic to aquatic life.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	CS_2
Molecular weight	:	76.14 g/mol
CAS-No.	:	75-15-0
EC-No.	:	200-843-6
Index-No.	:	006-003-00-3

Hazardous components

Component	Classification	Concentration
Carbon disulphide		
	Flam. Liq. 2; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; Repr. 2; STOT RE 1; Aquatic Acute 2; H225, H315, H319, H332, H361, H372, H401	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Sulphur oxides
Flash back possible over considerable distance., Container explosion may occur under fire conditions., Vapours may form explosive mixture with air., May explode when heated.

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Refrigerate before opening.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Carbon disulphide	75-15-0	TWA	1 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Peripheral Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen Danger of cutaneous absorption		
		TWA	1.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Peripheral Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen Danger of cutaneous absorption		
		TWA	20.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.3-1968		
		CEIL	30.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.3-1968		
		Peak	100.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.3-1968		
		TWA	1.000000 ppm 3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		
		ST	10.000000 ppm 30.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		
		See Table Z-2		
		TWA	20 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.3-1968		
		CEIL	30 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.3-1968		

		Peak	100 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.3-1968		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Carbon disulphide	75-15-0	2-Thiothiazolidine-4-carboxylix acid (TTCA)	0.5000 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: colourless
b)	Odour	Stench.
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -112 °C (-170 °F) - lit.
f)	Initial boiling point and boiling range	46 °C (115 °F) - lit.
g)	Flash point	-30 °C (-22 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 50 %(V) Lower explosion limit: 1.3 %(V)
k)	Vapour pressure	394.956 hPa (296.241 mmHg) at 20 °C (68 °F) 1,342.711 hPa (1,007.116 mmHg) at 55 °C (131 °F)
l)	Vapour density	2.63 - (Air = 1.0)
m)	Relative density	1.266 g/mL at 25 °C (77 °F)
n)	Water solubility	2.9 g/l at 20 °C (68 °F) - OECD Test Guideline 105
o)	Partition coefficient: n-octanol/water	log Pow: 2.7 at 25 °C (77 °F)
p)	Auto-ignition temperature	97 - 107 °C (207 - 225 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	71.9 mN/m at 19.5 °C (67.1 °F)
Relative vapour density	2.63 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Alkali metals, Zinc, Amines, Azides, Oxidizing agents

10.6 Hazardous decomposition products

Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - female - > 2,000 mg/kg
(OECD Test Guideline 423)

LC50 Inhalation - Rat - male and female - 4 h - 10.35 mg/l
(OECD Test Guideline 403)

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
- Mouse
Result: Does not cause skin sensitisation.
(OECD Test Guideline 429)

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.

Ames test
Salmonella typhimurium
Result: negative

Carcinogenicity

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
Suspected human reproductive toxicant

May cause reproductive disorders.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: FF6650000

May cause convulsions.

Liver - Irregularities - Based on Human Evidence
Liver - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Poecilia reticulata (guppy) - 4 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 2.1 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	Growth inhibition EC50 - Chlorella pyrenoidosa - 21 mg/l - 96 h (OECD Test Guideline 201)

12.2 Persistence and degradability

Biodegradability: aerobic - Exposure time 28 d
Result: > 80 % - Readily biodegradable
(OECD Test Guideline 301D)

12.3 Bioaccumulative potential

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life.

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1131 Class: 3 (6.1) Packing group: I
Proper shipping name: Carbon disulfide
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1131 Class: 3 (6.1) Packing group: I EMS-No: F-E, S-D
Proper shipping name: CARBON DISULPHIDE

IATA
UN number: 1131 Class: 3 (6.1)
Proper shipping name: Carbon disulphide
IATA Passenger: Not permitted for transport
IATA Cargo: Not permitted for transport

15. REGULATORY INFORMATION

SARA 302 Components

The following components are subject to reporting levels established by SARA Title III, Section 302:

	CAS-No.	Revision Date
Carbon disulphide	75-15-0	2007-07-01

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Carbon disulphide	75-15-0	2007-07-01

SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Carbon disulphide	75-15-0	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Carbon disulphide	75-15-0	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Carbon disulphide	75-15-0	2007-07-01

California Prop. 65 Components

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

	CAS-No.	Revision Date
Carbon disulphide	75-15-0	2008-06-17

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H361	Suspected of damaging fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure if inhaled.
H401	Toxic to aquatic life.
Repr.	Reproductive toxicity

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.6 Revision Date: 12/10/2015 Print Date: 02/09/2016

SAFETY DATA SHEET

Version 5.10
Revision Date 01/06/2016
Print Date 03/03/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Carbon tetrachloride

Product Number : 319961
Brand : Sigma-Aldrich
Index-No. : 602-008-00-5

CAS-No. : 56-23-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 3), H331
Acute toxicity, Dermal (Category 3), H311
Skin sensitisation (Sub-category 1B), H317
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Inhalation (Category 1), Liver, Kidney, H372
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412
Hazardous to the ozone layer (Category 1), H420

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled
H317	May cause an allergic skin reaction.
H351	Suspected of causing cancer.
H372	Causes damage to organs (Liver, Kidney) through prolonged or repeated exposure if inhaled.

H412	Harmful to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P272	Contaminated work clothing should not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician. Rinse mouth.
P302 + P352 + P312	IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or doctor/ physician if you feel unwell.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.
P502	Refer to manufacturer/ supplier for information on recovery/ recycling.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Rapidly absorbed through skin.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Tetrachloromethane
Formula	:	CCl_4CCl_4
Molecular weight	:	153.82 g/mol
CAS-No.	:	56-23-5
EC-No.	:	200-262-8
Index-No.	:	602-008-00-5

Hazardous components

Component	Classification	Concentration
Tetrachloromethane		
	Acute Tox. 3; Skin Sens. 1B; Carc. 2; STOT RE 1; Aquatic Acute 3; Aquatic Chronic 3; Ozone 1; H301 + H311 + H331, H317, H351, H372, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Tetrachloromethane	56-23-5	TWA	5.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Liver damage Suspected human carcinogen Danger of cutaneous absorption		
		STEL	10.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Liver damage Suspected human carcinogen Danger of cutaneous absorption		
		ST	2.000000 ppm 12.600000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		TWA	10.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.17-1967		
		CEIL	25.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.17-1967		
		Peak	200.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.17-1967		
		See Table Z-2		
		TWA	5 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Liver damage Suspected human carcinogen Danger of cutaneous absorption		
		STEL	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Liver damage Suspected human carcinogen Danger of cutaneous absorption		
		ST	2 ppm 12.6 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		See Table Z-2		
		TWA	10 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.17-1967		
		CEIL	25 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.17-1967		
		Peak	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.17-1967		
		TWA	2 ppm 12.6 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 240 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: colourless
b)	Odour	sweet
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -23 °C (-9 °F) - lit.
f)	Initial boiling point and boiling range	76 - 77 °C (169 - 171 °F) - lit.
g)	Flash point	does not flash
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower	No data available

	flammability or explosive limits	
k)	Vapour pressure	45 hPa (34 mmHg) at 0.3 °C (32.5 °F) 120 hPa (90 mmHg) at 19.8 °C (67.6 °F) 14,549 hPa (10,913 mmHg) at 24 °C (75 °F)
l)	Vapour density	No data available
m)	Relative density	1.594 g/cm3 at 25 °C (77 °F)
n)	Water solubility	0.8461 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 2.83 at 25 °C (77 °F)
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	26.7 mN/m at 20 °C (68 °F) 19.5 mN/m at 80 °C (176 °F)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 2,350 mg/kg

LC50 Inhalation - Rat - 4 h - 8000 ppm

LD50 Dermal - Rabbit - > 20,000 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Mild skin irritation - 24 h
(Draize Test)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation - 24 h
(Draize Test)

Respiratory or skin sensitisation
- Mouse
Result: The product is a skin sensitiser, sub-category 1B.
(OECD Test Guideline 429)

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification. Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Tetrachloromethane)
NTP:	Reasonably anticipated to be a human carcinogen (Tetrachloromethane)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Inhalation - Causes damage to organs through prolonged or repeated exposure. - Liver, Kidney

Aspiration hazard
No data available

Additional Information
RTECS: FG4900000

Vomiting, Diarrhoea, Abdominal pain, Nausea, Dizziness, Headache, Damage to the eyes., Liver injury may occur., Kidney injury may occur., Exposure to and/or consumption of alcohol may increase toxic effects., Contact with skin can cause:, Pain, Erythema, hyperemia

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality LC50 - Danio rerio (zebra fish) - 24.3 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 35 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	Growth inhibition EC50 - Algae - 20 mg/l - 72 h (OECD Test Guideline 201)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 21 d - 52.3 µg/l
	Bioconcentration factor (BCF): 30

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1846 Class: 6.1 Packing group: II
Proper shipping name: Carbon tetrachloride
Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1846 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: CARBON TETRACHLORIDE
Marine pollutant: yes

IATA
UN number: 1846 Class: 6.1 Packing group: II
Proper shipping name: Carbon tetrachloride

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Tetrachloromethane	56-23-5	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Tetrachloromethane	56-23-5	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Tetrachloromethane	56-23-5	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Tetrachloromethane	56-23-5	2007-07-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer.	56-23-5	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H301	Toxic if swallowed.
H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled
H311	Toxic in contact with skin.
H317	May cause an allergic skin reaction.
H331	Toxic if inhaled.
H351	Suspected of causing cancer.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.10 Revision Date: 01/06/2016 Print Date: 03/03/2016

SAFETY DATA SHEET

Version 6.4
Revision Date 03/08/2024
Print Date 05/12/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Chlorobenzene-$^{13}C_6$

Product Number : 488534
Brand : Aldrich
Index-No. : 602-033-00-1
CAS-No. : 287389-52-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 3), H226
Acute toxicity, Inhalation (Category 4), H332
Short-term (acute) aquatic hazard (Category 2), H401
Long-term (chronic) aquatic hazard (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Pictogram



Signal Word Warning

Hazard Statements

H226	Flammable liquid and vapor.
H332	Harmful if inhaled.
H411	Toxic to aquatic life with long lasting effects.

Precautionary Statements

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing mist or vapors.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	$^{13}C_6H_5Cl$
Molecular weight	:	118.45 g/mol
CAS-No.	:	287389-52-0
Index-No.	:	602-033-00-1

Component	Classification	Concentration
Chlorobenzene-13C6		
	Flam. Liq. 3; Acute Tox. 4; Aquatic Acute 2; Aquatic Chronic 2; H226, H332, H401, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. If breathing stops: mouth-to-mouth breathing or artificial respiration. Oxygen if necessary. Immediately call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most). Consult doctor if feeling unwell.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas
Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air at elevated temperatures.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

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5.4 Further information

Remove container from danger zone and cool with water. Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

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SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Chlorobenzene-13C6	287389-52-0	TWA	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Confirmed animal carcinogen with unknown relevance to humans		
		TWA	75 ppm 350 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	10 ppm 46 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Chlorobenzene-13C6	287389-52-0	4-Chlorocatechol	100mg/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		p-Chlorophenol	20mg/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
required

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter type ABEK

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The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -45 °C (-49 °F) - lit.
f)	Initial boiling point and boiling range	132 °C 270 °F - lit.
g)	Flash point	23.9 °C (75.0 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	1.164 g/mL at 25 °C (77 °F)1.164 g/cm3 at 25 °C (77 °F)
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 5.0
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available

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s) Explosive properties No data available

t) Oxidizing properties No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
Vapor/air-mixtures are explosive at intense warming.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heating.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
LC50 Inhalation - 4.0 h - 11.0 mg/l - vapor

Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
Remarks: No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

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NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Incoordination., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 1134 Class: 3 Packing group: III
Proper shipping name: Chlorobenzene
Reportable Quantity (RQ): 100 lbs
Reportable Quantity (RQ): 100 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1134 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: CHLOROBENZENE
Marine pollutant : yes

IATA
UN number: 1134 Class: 3 Packing group: III
Proper shipping name: Chlorobenzene

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Chlorobenzene-13C6	287389-52-0	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Chronic Health Hazard

Reportable Quantity : D021 lbs

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Chlorobenzene-13C6	287389-52-0	2007-07-01

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SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.4 Revision Date: 03/08/2024 Print Date: 05/12/2024

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SAFETY DATA SHEET

Ethyl Chloride

Section 1. Identification

GHS product identifier : Ethyl Chloride

Chemical name : chloroethane

Other means of identification : Ethane, chloro-; Ethyl chloride; Ethane, chloro- (chloroethane)

Product use : Synthetic/Analytical chemistry.

Synonym : Ethane, chloro-; Ethyl chloride; Ethane, chloro- (chloroethane)

SDS # : 001023

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Emergency telephone number (with hours of operation) : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Liquefied gas
CARCINOGENICITY - Category 2
AQUATIC HAZARD (LONG-TERM) - Category 3

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements : Extremely flammable gas.
May form explosive mixtures with air.
Contains gas under pressure; may explode if heated.
May cause frostbite.
May displace oxygen and cause rapid suffocation.
Suspected of causing cancer.
Harmful to aquatic life with long lasting effects.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach suspected leak area with caution.

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Section 2. Hazards identification

Prevention : Never Put cylinders into unventilated areas of passenger vehicles. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Avoid release to the environment.

Response : IF exposed or concerned: Get medical attention. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

Storage : Store locked up. Protect from sunlight. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : Liquid can cause burns similar to frostbite.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : chloroethane

Other means of identification : Ethane, chloro-; Ethyl chloride; Ethane, chloro- (chloroethane)

CAS number/other identifiers

CAS number : 75-00-3

Product code : 001023

Ingredient name	%	CAS number
Ethyl chloride	100	75-00-3

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Continue to rinse for at least 10 minutes. Get medical attention. In case of contact with liquid, warm frozen tissues slowly with lukewarm water and get medical attention. Do not rub affected area. Wash clothing before reuse. Clean shoes thoroughly before reuse.

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Section 4. First aid measures

Ingestion : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention. Ingestion of liquid can cause burns similar to frostbite. If frostbite occurs, get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. As this product rapidly becomes a gas when released, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Liquid can cause burns similar to frostbite.

Inhalation : Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : Ingestion of liquid can cause burns similar to frostbite.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
frostbite

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
frostbite

Ingestion : Adverse symptoms may include the following:
frostbite

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Gas may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back, causing fire or explosion. This material is harmful to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

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Section 5. Fire-fighting measures

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
halogenated compounds
carbonyl halides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. For incidents involving large quantities, thermally insulated undergarments and thick textile or leather gloves should be worn.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Avoid breathing gas. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-

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Section 7. Handling and storage

sparking tools. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Store locked up. Eliminate all ignition sources. Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Ethyl chloride	**ACGIH TLV (United States, 3/2012).** **Absorbed through skin.** TWA: 264 mg/m³ 8 hours. TWA: 100 ppm 8 hours. **OSHA PEL (United States, 6/2010).** TWA: 2600 mg/m³ 8 hours. TWA: 1000 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 2600 mg/m³ 8 hours. TWA: 1000 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

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Section 8. Exposure controls/personal protection

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. If contact with the liquid is possible, insulated gloves suitable for low temperatures should be worn. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [Liquefied gas]

Color : Colorless.

Molecular weight : 64.52 g/mole

Molecular formula : C2-H5-Cl

Boiling/condensation point : 12.3°C (54.1°F)

Melting/freezing point : -138.7°C (-217.7°F)

Critical temperature : 187.25°C (369.1°F)

Odor : Characteristic. Ether-like.

Odor threshold : Not available.

pH : Not available.

Flash point : Closed cup: -50°C (-58°F)

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge, heat and oxidizing materials.

Lower and upper explosive (flammable) limits : Lower: 3.16%
Upper: 15%

Vapor pressure : 5.6 psi

Vapor density : 2.22 (Air = 1)

Specific Volume (ft ^{3}/lb) : 6.0241

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Section 9. Physical and chemical properties

Gas Density (lb/ft ^{3}) : 0.166

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 5.74 g/l

Partition coefficient: n-octanol/water : 1.43

Auto-ignition temperature : 519°C (966.2°F)

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow gas to accumulate in low or confined areas.

Incompatibility with various substances : Extremely reactive or incompatible with the following materials: oxidizing materials.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Classification

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Section 11. Toxicological information

Product/ingredient name	OSHA	IARC	NTP
Ethyl chloride	-	3	-

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Liquid can cause burns similar to frostbite.

Inhalation : Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.

Ingestion : Ingestion of liquid can cause burns similar to frostbite.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
frostbite

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
frostbite

Ingestion : Adverse symptoms may include the following:
frostbite

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

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Section 11. Toxicological information

Carcinogenicity : Suspected of causing cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Ethyl chloride	1.43	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

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Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1037	UN1037	UN1037	UN1037	UN1037
UN proper shipping name	ETHYL CHLORIDE	ETHYL CHLORIDE	ETHYL CHLORIDE	ETHYL CHLORIDE	ETHYL CHLORIDE (CYLINDERS)
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	**Reportable quantity** 100 lbs / 45.4 kg Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. **Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: Forbidden. **Cargo aircraft** Quantity limitation: 150 kg **Special provisions** B77, T50	**Explosive Limit and Limited Quantity Index** 0.125 **ERAP Index** 3000 **Passenger Carrying Road or Rail Index** Forbidden	-	-	**Passenger and Cargo Aircraft**Quantity limitation: 0 Forbidden **Cargo Aircraft Only** Quantity limitation: 150 kg

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Water Act (CWA) 307: chloroethane

Clean Air Act (CAA) 112 regulated flammable substances: chloroethane

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

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Section 15. Regulatory information

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Sudden release of pressure
Delayed (chronic) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Ethyl chloride	100	Yes.	Yes.	No.	No.	Yes.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	chloroethane	75-00-3	100
Supplier notification	chloroethane	75-00-3	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : This material is listed.

New York : This material is listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
chloroethane	Yes.	No.	Yes.	No.

Canada inventory : This material is listed or exempted.

International regulations

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Section 15. Regulatory information

International lists : **Australia inventory (AICS)**: This material is listed or exempted.
China inventory (IECSC): This material is listed or exempted.
Japan inventory: This material is listed or exempted.
Korea inventory: This material is listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): This material is listed or exempted.
Philippines inventory (PICCS): This material is listed or exempted.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

Canada

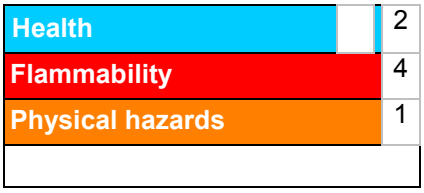
WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class A: Compressed gas.
Class B-1: Flammable gas.

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



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Section 16. Other information

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of printing : 5/18/2015.

Date of issue/Date of revision : 5/18/2015.

Date of previous issue : 10/15/2014.

Version : 0.03

Key to abbreviations :
ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United NationsACGIH – American Conference of Governmental Industrial Hygienists
AIHA – American Industrial Hygiene Association
CAS – Chemical Abstract Services
CEPA – Canadian Environmental Protection Act
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)
CFR – United States Code of Federal Regulations
CPR – Controlled Products Regulations
DSL – Domestic Substances List
GWP – Global Warming Potential
IARC – International Agency for Research on Cancer
ICAO – International Civil Aviation Organisation
Inh – Inhalation
LC – Lethal concentration
LD – Lethal dosage
NDSL – Non-Domestic Substances List
NIOSH – National Institute for Occupational Safety and Health
TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

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Section 16. Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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SAFETY DATA SHEET

Version 6.11
Revision Date 09/06/2024
Print Date 09/07/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Chloroform

Product Number : 288306
Brand : Sigma-Aldrich
Index-No. : 602-006-00-4
CAS-No. : 67-66-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 3), H331
Skin irritation (Category 2), H315

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Eye irritation (Category 2A), H319
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 2), H361
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Specific target organ toxicity - repeated exposure, Oral (Category 1), Liver, Kidney, H372
Short-term (acute) aquatic hazard (Category 3), H402

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word: Danger

Hazard Statements

H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H331	Toxic if inhaled.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H361	Suspected of damaging fertility or the unborn child.
H372	Causes damage to organs (Liver, Kidney) through prolonged or repeated exposure if swallowed.
H402	Harmful to aquatic life.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe mist or vapors.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal

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plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Trichloromethane
Methylidyne trichloride

Formula : $CHCl_3$
Molecular weight : 119.38 g/mol
CAS-No. : 67-66-3
EC-No. : 200-663-8
Index-No. : 602-006-00-4

Component	Classification	Concentration
Chloroform		
	Acute Tox. 4; Acute Tox. 3; Skin Irrit. 2; Eye Irrit. 2A; Carc. 2; Repr. 2; STOT SE 3; STOT RE 1; Aquatic Acute 3; H302, H331, H315, H319, H351, H361, H336, H372, H402 Concentration limits: 20 %: STOT SE 3, H336;	<= 100 %

ethanol		
	Flam. Liq. 2; Eye Irrit. 2A; H225, H319 Concentration limits: >= 50 %: Eye Irrit. 2A, H319;	>= 1 - < 5 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

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In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

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6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling

Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Hygiene measures

Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions

Tightly closed. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class

Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Chloroform	67-66-3	TWA	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Confirmed animal carcinogen with unknown relevance to humans		
		ST	2 ppm 9.78 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen		

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		C	50 ppm 240 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	2 ppm 9.78 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
ethanol	64-17-5	TWA	1,000 ppm 1,900 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		STEL	1,000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Confirmed animal carcinogen with unknown relevance to humans		
		TWA	1,000 ppm 1,900 mg/m3	USA. NIOSH Recommended Exposure Limits
		PEL	1,000 ppm 1,900 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Viton®
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: butyl-rubber
Minimum layer thickness: 0.7 mm
Break through time: 10 min

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Material tested:Butoject® (KCL 898)

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter type AX
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Color: colorless
b)	Odor	sweet
c)	Odor Threshold	205 ppm
d)	pH	No data available
e)	Melting point/freezing point	Melting point: -64 °C (-83 °F)
f)	Initial boiling point and boiling range	60.5 - 61.5 °C 140.9 - 142.7 °F at 1,013.25 hPa
g)	Flash point	() - Regulation (EC) No. 440/2008, Annex, A.9does not flash
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	210 hPa at 20 °C (68 °F)
l)	Vapor density	4.12 - (Air = 1.0)
m)	Density	1.49 g/cm3 at 25 °C (77 °F)
	Relative density	No data available
n)	Water solubility	8.7 g/l at 23 °C (73 °F) - OECD Test Guideline 105 - soluble
o)	Partition coefficient: n-octanol/water	No data available

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p)	Autoignition temperature	No data available
q)	Decomposition temperature	Distillable in an undecomposed state at normal pressure.
r)	Viscosity	No data available
s)	Explosive properties	Not classified as explosive.
t)	Oxidizing properties	none

9.2 Other safety information

Solubility in other solvents	organic solvent at 20 °C (68 °F) - miscible
Relative vapor density	4.12 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity

No data available

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .
Contains the following stabilizer(s):
ethanol (>=0.5 - <=1 %)

10.3 Possibility of hazardous reactions

Risk of explosion with:
Ammonia
Amines
nitrogen oxides
bases
Oxygen
alkali amides
organic nitro compounds
strong alkalis
Fluorine
peroxi compounds
Alkaline earth metals
Alkali metals
Powdered metals
Methanol
with
alcoholates
Methanol
with
strong alkalis
Iron
in powder form
various alloys

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sensitive to shock
Methanol
with
Sodium hydroxide
magnesium
in powder form
Oxygen
with
alkali compounds
Aluminum
in powder form
Acetone
with
alkali compounds
Potassium
sensitive to shock
sodium
sensitive to shock
Violent reactions possible with:
phosphines
bis(dimethylamino)dimethyl tin
nonmetallic hydrogen compounds
Powdered metals
Light metals
Ketones
mineral acids
Strong oxidizing agents
semimetallic hydrogen compounds

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Acute toxicity estimate Oral - 912.56 mg/kg
(Calculation method)
LD50 Oral - Rat - male - 908 mg/kg
(OECD Test Guideline 401)
Acute toxicity estimate Inhalation - 4 h - 3.12 mg/l - vapor(Calculation method)

LC50 Inhalation - Rat - 6 h - 9.17 mg/l - vapor

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Acute toxicity estimate Inhalation - Expert judgment - 4 h - 3.1 mg/l - vapor

Dermal: No data available
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Irritating to skin. - 24 h
Remarks: (ECHA)
Remarks: Drying-out effect resulting in rough and chapped skin.
Skin - Rabbit
Result: slight irritation
Remarks: (IUCLID)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Irritating to eyes.
Remarks: (ECHA)
Remarks: (Regulation (EC) No 1272/2008, Annex VI)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(Regulation (EC) No. 440/2008, Annex, B.6)

Germ cell mutagenicity
Test Type: Ames test
Test system: Escherichia coli/Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Result: negative
Remarks: (ECHA)
Test Type: unscheduled DNA synthesis assay
Test system: Liver
Metabolic activation: without metabolic activation
Result: negative
Remarks: (ECHA)

Test Type: Micronucleus test
Species: Rat
Cell type: Red blood cells (erythrocytes)
Application Route: Oral
Method: OECD Test Guideline 474
Result: negative

Test Type: unscheduled DNA synthesis assay
Species: Rat
Cell type: Liver cells
Application Route: Oral
Method: OECD Test Guideline 486
Result: negative

Test Type: in vivo assay
Species: Mouse

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Application Route: Inhalation

Result: negative
Remarks: (ECHA)

Carcinogenicity
Suspected of causing cancer.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Chloroform)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Chloroform)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
Suspected of damaging the unborn child.

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
Oral - Causes damage to organs through prolonged or repeated exposure.
- Liver, Kidney

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Rat - female - Oral - NOAEL (No observed adverse effect level) - 34 mg/kg

Vomiting, Cough, irritant effects, Shortness of breath, respiratory arrest, narcosis, Dizziness, Nausea, agitation, spasms, inebriation, Headache, Stomach/intestinal disorders, ataxia (impaired locomotor coordination), cardiovascular disorders
Drying-out effect resulting in rough and chapped skin.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Crassostrea gigas - 152.5 mg/l - 48 h Remarks: (ECHA)
Toxicity to algae	static test ErC50 - Chlamydomonas reinhardtii (green algae) - 13.3 mg/l - 72 h Remarks: (ECHA)

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Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	semi-static test NOEC - Daphnia magna (Water flea) - 6.3 mg/l - 21 d Remarks: (ECHA)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 1888 Class: 6.1 Packing group: III
Proper shipping name: ChloroformSOLUTION

Reportable Quantity (RQ): 10 lbs
Reportable Quantity (RQ): 10 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1888 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: CHLOROFORMSOLUTION

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IATA
UN number: 1888 Class: 6.1 Packing group: III
Proper shipping name: ChloroformSOLUTION

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Chloroform	67-66-3	10	10
Chloroform	67-66-3	10	10 (D022)

SARA 304 Extremely Hazardous Substances Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Chloroform	67-66-3	10	10

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

Components	CAS-No.	Component TPQ (lbs)
Chloroform	67-66-3	10000

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Chloroform 67-66-3 >= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

Chloroform 67-66-3
ethanol 64-17-5

Pennsylvania Right To Know

Chloroform 67-66-3
ethanol 64-17-5

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

California Prop. 65

WARNING: This product can expose you to chemicals including Chloroform, which is/are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

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TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.11 Revision Date: 09/06/2024 Print Date: 09/07/2024

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SAFETY DATA SHEET

Version 6.8
Revision Date 09/07/2024
Print Date 09/08/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Chromium

Product Number : 266299
Brand : Aldrich
CAS-No. : 7440-47-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Not a hazardous substance or mixture.

2.2 GHS Label elements, including precautionary statements

Not a hazardous substance or mixture.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

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SECTION 3: Composition/information on ingredients

3.1 Substances

Formula : Cr
Molecular weight : 52.00 g/mol
CAS-No. : 7440-47-3
EC-No. : 231-157-5

Component	Classification	Concentration
chromium		
		<= 100 %

SECTION 4: First aid measures

4.1 Description of first-aid measures

If inhaled
After inhalation: fresh air.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most). Consult doctor if feeling unwell.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Chromium oxides

5.3 Advice for firefighters

In the event of fire, wear self-contained breathing apparatus.

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5.4 Further information
none

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid inhalation of dusts. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
No special precautionary measures necessary.

6.3 Methods and materials for containment and cleaning up
Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry.

Air sensitive.

Storage class
Storage class (TRGS 510): 11: Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

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Component	CAS-No.	Value	Control parameters	Basis
chromium	7440-47-3	TWA	0.5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		PEL	0.5 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
chromium	7440-47-3	Total chromium	0.7 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Change contaminated clothing. Wash hands after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our

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customers. It should not be construed as offering an approval for any specific use scenario.

Respiratory protection
Recommended Filter type: Filter type P1
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
No special precautionary measures necessary.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Color: light gray
b)	Odor	odorless
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 1,857 °C (3,375 °F) - lit.
f)	Initial boiling point and boiling range	2,672 °C 4,842 °F - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	7.14 g/mL at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances

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p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
Strong acids, Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
Remarks: No data available

Serious eye damage/eye irritation
Remarks: No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity

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No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: GB4200000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LC50 - Cyprinus carpio (Carp) - 14.3 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.07 mg/l - 48 h

12.2 Persistence and degradability

The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

Bioaccumulation	Oncorhynchus mykiss (rainbow trout) - 30 d - 50 µg/l(chromium)
	Bioconcentration factor (BCF): 1.03 - 1.22

12.4 Mobility in soil

No data available

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12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)

UN number: 3077 Class: 9 Packing group: III

Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (chromium)

Reportable Quantity (RQ): 5000 lbs

Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

IMDG

Not dangerous goods

IATA

Not dangerous goods

Further information

Not classified as dangerous in the meaning of transport regulations.

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
chromium	7440-47-3	5000	5000

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SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

chromium	7440-47-3	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

chromium	7440-47-3

Pennsylvania Right To Know

chromium	7440-47-3

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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SAFETY DATA SHEET

Based on Directive 2001/58/EC of the Commission of the European Communities

CHRYSENE

1. Identification of the substance/preparation and of the company/undertaking

1.1 Identification of the substance or preparation:

Synonyms: none
CAS No. : 218-01-9
EC index No. : 601-048-00-0
EINECS No. : 205-923-4
RTECS No. : GC0700000
BCR number : BCR-269
NFPA code : N.D.
Molecular weight : 228.30
Formula : C18H12

1.2 Use of the substance or the preparation:
Certified reference material for laboratory use only

1.3 Company/undertaking identification:
Institute for Reference Materials and Measurements
Retieseweg
B-2440 Geel
Tel. : +32 14 57 12 11
Fax : +32 14 58 42 73

1.4 Telephone number for emergency:
+32 70 245 245
Antigifcentrum
p/a Militair Hospitaal Koningin Astrid, Bruynstraat, B-1120 Brussel

2. Composition/information on ingredients

Hazardous ingredients	CAS No. EINECS No.	Conc. in %	Hazard symbol	Risks (R-phrases)
chrysene	218-01-9 205-923-4	100	T;N	45-50/53 (1)

(1) For R-phrases in full: see heading 16

3. Hazards identification

- May cause cancer
- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

4. First aid measures

4.1 Eye contact:
- Consult a doctor/medical service if irritation persists
- Rinse immediately with water

4.2 Skin contact:
- Consult a doctor/medical service if irritation persists
- Wash with water and soap
- Wipe off dry product from skin
- Remove clothing before washing

4.3 After inhalation:
- Consult a doctor/medical service if breathing problems develop
- Remove the victim into fresh air
- Unconscious: maintain adequate airway and respiration

4.4 After ingestion:
- Consult a doctor/medical service if you feel unwell
- Immediately give lots of water to drink
- Never give water to an unconscious person

- Do not induce vomiting

5. Fire-fighting measures

5.1 Suitable extinguishing media:
- Water spray
- Alcohol foam
- Polymer foam
- ABC powder
- Carbon dioxide

5.2 Unsuitable extinguishing media:
- Solid water jet ineffective as extinguishing medium

5.3 Special exposure hazards:
- Not easily combustible
- Upon combustion CO and CO2 are formed

5.4 Instructions:
- Take account of toxic firefighting water
- Use firefighting water moderately and contain it

5.5 Special protective equipment for firefighters:
- Heat/fire exposure: compressed air/oxygen apparatus
- Dust cloud production: compressed air/oxygen apparatus

6. Accidental release measures

6.1 Personal protection/precautions: see heading 8.1/8.3/10.3

6.2 Environmental precautions:
- Prevent soil and water pollution
- Substance must not be discharged into the sewer
- Dam up the solid spill

6.3 Methods for cleaning up:
- Stop dust cloud by covering with sand/earth
- Carefully collect the spill/leftovers
- Scoop solid spill into closing containers
- Spill must not return in its original container
- Take collected spill to manufacturer/competent authority
- Clean contaminated surfaces with an excess of water
- Wash clothing and equipment after handling

7. Handling and storage

7.1 Handling:
- Observe strict hygiene
- Avoid prolonged and repeated contact with skin
- Avoid raising dust
- Do not discharge the waste into the drain
- Remove contaminated clothing immediately

7.2 Storage:
- Keep container tightly closed. Store only in a limited quantity. Store in a dry area. Store in a dark area.
- Keep away from: heat sources, ignition sources, oxidizing agents, acids

Storage temperature	:	N.D.	**°C**
Quantity limits	:	N.D.	**kg**
Storage life	:	N.D.	
Materials for packaging	:		

- suitable : no data available
- to avoid : no data available

7.3 Specific uses:
- See information supplied by the manufacturer

8. Exposure controls/Personal protection

8.1 Exposure limit values:

TLV-TWA	:	not listed
TLV-STEL	:	not listed
TLV-Ceiling	:	not listed
OES-LTEL	:	not listed
OES-STEL	:	not listed
MEL-LTEL	:	not listed
MEL-STEL	:	not listed
MAK	:	not listed
TRK	:	not listed
MAC-TGG 8 h	:	not listed
MAC-TGG 15 min.	:	not listed
MAC-Ceiling	:	not listed
VME-8 h	:	not listed
VLE-15 min.	:	not listed
GWBB-8 h	:	not listed
GWK-15 min.	:	not listed
Momentary value	:	not listed
EC	:	not listed
EC-STEL	:	not listed

Sampling methods:

- Chrysene (Polynuclear aromatic Hydrocarbons)	NIOSH 5515
- Chrysene	OSHA 58
- Chrysene (Polynuclear aromatic Hydrocarbons)	NIOSH 5506

8.2 Exposure controls:

8.2.1 Occupational exposure controls:
- Measure the concentration in the air regularly
- Work under local exhaust/ventilation

8.2.2 Environmental exposure controls: see heading 13

8.3 Personal protection:

8.3.1 respiratory protection:
- Dust production: dust mask with filter type P3
- High dust production: compressed air/oxygen apparatus

8.3.2 hand protection:
- Gloves
  Suitable materials: No data available

- Breakthrough time: N.D.

8.3.3 eye protection:
- Safety glasses
- In case of dust production: protective goggles

8.3.4 skin protection:
- Protective clothing
- In case of dust production: head/neck protection
  Suitable materials: No data available

9. Physical and chemical properties

9.1 General information:

Appearance (at 20°C)	:	Crystalline solid / Flakes
Odour	:	Odourless
Colour	:	White

9.2 Important health, safety and environmental information:

pH value	:	N.D.	
Boiling point/boiling range	:	448	**°C**
Flashpoint	:	N.D.	**°C**
Explosion limits	:	N.D.	**vol%** (**°C**)
Vapour pressure (at 20°C)	:	N.D.	**hPa**
Vapour pressure (at 50°C)	:	N.D.	**hPa**
Relative density (at 20°C)	:	1.27	
Water solubility	:	< 0.001	**g/100 ml**
Soluble in	:	N.D.	
Relative vapour density	:	N.D.	
Viscosity	:	N.D.	**Pa.s**
Partition coëfficient n-octanol/water	:	5.61/5.73	
Evaporation rate			
ratio to butyl acetate	:	N.D.	
ratio to ether	:	N.D.	

9.3 Other information:

Melting point/melting range	:	256	**°C**
Auto-ignition point	:	N.D.	**°C**
Saturation concentration	:	N.D.	**g/m^3**

10. Stability and reactivity

10.1 Conditions to avoid/reactivity:
- Stable under normal conditions

10.2 Materials to avoid:
- Keep away from: heat sources, ignition sources, oxidizing agents, acids

10.3 Hazardous decomposition products:
- Upon combustion CO and CO2 are formed
- Reacts violently with (strong) oxidizers
- Decomposes on exposure to (strong) acids

11. Toxicological information

11.1 Acute toxicity:

LD50 oral rat	:	N.D.	**mg/kg**
LD50 dermal rat	:	N.D.	**mg/kg**
LD50 dermal rabbit	:	N.D.	**mg/kg**
LC50 inhalation rat	:	N.D.	**mg/1/4 h**
LC50 inhalation rat	:	N.D.	**ppm/4 h**

11.2 Chronic toxicity:

EC carc. cat.	:	2
EC muta. cat.	:	3
EC repr. cat.	:	not listed
Carcinogenicity (TLV)	:	A3
Carcinogenicity (MAC)	:	K
Carcinogenicity (VME)	:	not listed
Carcinogenicity (GWBB)	:	not listed
Carcinogenicity (MAK)	:	2
Mutagenicity (MAK)	:	not listed
Teratogenicity (MAK)	:	-
IARC classification	:	3

11.3 Routes of exposure: ingestion, inhalation, eyes and skin
Caution! Substance is absorbed through the skin

11.4 Acute effects/symptoms:

AFTER SKIN CONTACT
- Slight irritation

11.5 Chronic effects:

- Probably human carcinogenic
- No certainty about human mutagenic properties

ON CONTINUOUS/REPEATED EXPOSURE/CONTACT:
- No specific information available

SIMILAR PRODUCTS CAUSE FOLLOWING SYMPTOMS:
- Feeling of weakness
- Photoallergy
- Cracking of the skin
- Skin rash/inflammation
- Skin cancer
- Lung tissue affection/degeneration
- Enlargement/affection of the liver
- Affection of the renal tissue

12. Ecological information

12.1 Ecotoxicity:

- LC50 (24 h) : 0.0007 mg/l (DAPHNIA MAGNA)
- LC50 (24 h) : >6.7 mg/l (RANA SP.)

12.2 Mobility:

- **Volatile organic compounds (VOC):** N.D.%

- Forming sediments in water
- Adsorbs into the soil
- Insoluble in water

For other physicochemical properties see heading 9.

12.3 Persistence and degradability:

- **biodegradation BOD_5** : N.D. **% ThOD**
- **water** : - Not readily biodegradable in water
- **soil** : **T ½:** > 77 **days**

12.4 Bioaccumulative potential:
- **log P_{ow}** : 5.61/5.73
- **BCF** : 4440 (LAMELLIBRANCHIATA)
- Highly bioaccumulative

12.5 Other adverse effects:

- **WGK** : 3 (Classification based on the R-phrases in compliance with Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS) of 17 May 1999)
- **Effect on the ozone layer** : Not dangerous for the ozone layer (Council Regulation (EC) 3093/94)
- **Greenhouse effect** : no data available
- **Effect on waste water purification** : no data available

13. Disposal considerations

13.1 Provisions relating to waste:

- Waste material code (91/689/EEC, Council Decision
- 2001/118/EC, O.J. L47 of 16/2/2001): 16 05 06 (laboratory chemicals, consisting of or containing dangerous substances, including mixtures of laboratory)
- Waste material code (Flanders): 001, 045, 691
- Waste code (Germany): 59302
- Hazardous waste (91/689/EEC)

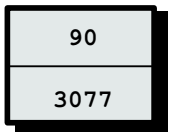
13.2 Disposal methods:

- Dissolve or mix with a combustible solvent
- Remove to an authorized incinerator equipped with an afterburner and a flue gas scrubber
- Do not discharge into surface water (2000/60/EEC, Council

13.3 Packaging/Container:

- Waste material code packaging (91/689/EEC, Council Decision
- 2001/118/EC, O.J. L47 of 16/2/2001): 15 01 10 (packaging containing residues of or contaminated by dangerous substances)

14. Transport information



14.1 Classification of the substance in compliance with UN Recommendations

UN number	: 3077
CLASS	: 9
SUB RISKS	: -
PACKING	: III
PROPER SHIPPING NAME	: UN 3077, Environmentally hazardous substance, solid, n.o.s. (chrysene)

14.2 ADR (transport by road)

CLASS	: 9
PACKING	: III
DANGER LABEL TANKS	: 9
DANGER LABEL PACKAGES	: 9

14.3 RID (transport by rail)

CLASS	: 9
PACKING	: III
DANGER LABEL TANKS	: 9
DANGER LABEL PACKAGES	: 9

14.4 ADNR (transport by inland waterways)

CLASS	: 9
PACKING	: III
DANGER LABEL TANKS	: 9
DANGER LABEL PACKAGES	: 9

14.5 IMDG (maritime transport)

CLASS	: 9
SUB RISKS	: -
PACKING	: III
MFAG	: -
EMS	: -
MARINE POLLUTANT	: P

14.6 ICAO (air transport)

CLASS	: 9
SUB RISKS	: -
PACKING	: III
PACKING INSTRUCTIONS PASSENGER AIRCRAFT	:
PACKING INSTRUCTIONS CARGO AIRCRAFT	:

14.7 Special precautions in connection with transport : none

14.8 Limited quantities (LQ) :

When substances and their packaging meet the conditions established by ADR/RID/ADNR in chapter 3.4, **only** the following prescriptions shall be complied with:
each package shall display a diamond-shaped figure with the following inscription:
- 'UN 3077'
or, in the case of different goods with different identification numbers within a single package:
- the letters 'LQ'

15. Regulatory information

Enumerated in substance list Annex I of directive 67/548/EEC et sequens



Toxic



Dangerous for the environment

R45 : May cause cancer
R50/53 : Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

S53 : Avoid exposure - obtain special instructions before use
S45 : In case of accident or if you feel unwell, seek medical advice (show the label where possible)
S60 : This material and/or its container must be disposed of as hazardous waste
S61 : Avoid release to the environment. Refer to special instructions/safety data sheets.

16. Other information

The information provided on this MSDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

N.A. = NOT APPLICABLE
N.D. = NOT DETERMINED
***** = INTERNAL CLASSIFICATION

Full text of any R-phrases referred to under heading 2:

R45 : May cause cancer
R50/53 : Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

Exposure limits:
TLV : Threshold Limit Value - ACGIH USA 2000
OES : Occupational Exposure Standards - United Kingdom 1999
MEL : Maximum Exposure Limits - United Kingdom 1999
MAK : Maximale Arbeitsplatzkonzentrationen - Germany 2001
TRK : Technische Richtkonzentrationen - Germany 2001
MAC : Maximale aanvaarde concentratie - The Netherlands 2002
VME : Valeurs limites de Moyenne d'Exposition - France 1999
VLE : Valeurs limites d'Exposition à court terme - France 1999
GWBB : Grenswaarde beroepsmatige blootstelling - Belgium 1998
GWK : Grenswaarde kortstondige blootstelling - Belgium 1998
EC : Indicative occupational exposure limit values - directive 2000/39/EC

Chronic toxicity:
K : List of the carcinogenic substances and processes - The Netherlands 2002

SAFETY DATA SHEET

Version 4.4
Revision Date 12/01/2015
Print Date 02/11/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : cis-Dichloroethylene

Product Number : 48597
Brand : Supelco
Index-No. : 602-026-00-3

CAS-No. : 156-59-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Acute toxicity, Inhalation (Category 4), H332
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H332 Harmful if inhaled.
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.

P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312	Call a POISON CENTER or doctor/ physician if you feel unwell.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	C2H2Cl2
Molecular weight	:	96.94 g/mol
CAS-No.	:	156-59-2
EC-No.	:	205-859-7
Index-No.	:	602-026-00-3

Hazardous components

Component	Classification	Concentration
cis-Dichloroethylene		
	Flam. Liq. 2; Acute Tox. 4; Aquatic Acute 3; Aquatic Chronic 3; H225, H332, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Recommended storage temperature 2 - 8 °C

Handle and store under inert gas. Air and moisture sensitive. Light sensitive.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
cis-Dichloroethylene	156-59-2	TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Eye irritation		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: light yellow
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	-80.0 °C (-112.0 °F)
f)	Initial boiling point and boiling range	60.0 - 61.0 °C (140.0 - 141.8 °F)
g)	Flash point	6.0 °C (42.8 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.28 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available

p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LC50 Inhalation - Rat - 13700 ppm
Remarks: Behavioral:Somnolence (general depressed activity). Liver:Fatty liver degeneration.

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: KV9420000

narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene

Poison Inhalation Hazard: No

IMDG
UN number: 1150 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: 1,2-DICHLOROETHYLENE

IATA
UN number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
cis-Dichloroethylene	156-59-2	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
cis-Dichloroethylene	156-59-2	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
cis-Dichloroethylene	156-59-2	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H332	Harmful if inhaled.
H402	Harmful to aquatic life.

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	1

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.4 Revision Date: 12/01/2015 Print Date: 02/11/2016

SAFETY DATA SHEET

Version 6.12
Revision Date 09/08/2024
Print Date 09/09/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Cobalt

Product Number : 266647
Brand : Aldrich
Index-No. : 027-001-00-9
CAS-No. : 7440-48-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable solids (Category 1), H228
Eye irritation (Category 2A), H319
Respiratory sensitization (Category 1), H334

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Skin sensitization (Category 1), H317
Germ cell mutagenicity (Category 2), H341
Carcinogenicity (Category 1B), H350
Reproductive toxicity (Category 1B), H360
Long-term (chronic) aquatic hazard (Category 4), H413

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word: Danger

Hazard Statements

H228	Flammable solid.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H360	May damage fertility or the unborn child.
H413	May cause long lasting harmful effects to aquatic life.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P261	Avoid breathing dust.
P264	Wash skin thoroughly after handling.
P272	Contaminated work clothing must not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P285	In case of inadequate ventilation wear respiratory protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P341	IF INHALED: If breathing is difficult, remove person to fresh air and keep comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P342 + P311	If experiencing respiratory symptoms: Call a POISON CENTER/ doctor.
P363	Wash contaminated clothing before reuse.

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P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	Co
Molecular weight	:	58.93 g/mol
CAS-No.	:	7440-48-4
EC-No.	:	231-158-0
Index-No.	:	027-001-00-9

Component	Classification	Concentration
Cobalt		
	Flam. Sol. 1; Eye Irrit. 2A; Resp. Sens. 1; Skin Sens. 1; Muta. 2; Carc. 1B; Repr. 1B; Aquatic Chronic 4; H228, H319, H334, H317, H341, H350, H360, H413	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

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4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Cobalt/cobalt oxides
Not combustible.
Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

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SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep away from heat and sources of ignition. Keep locked up or in an area accessible only to qualified or authorized persons.

Air sensitive. Handle and store under inert gas.

Storage class
Storage class (TRGS 510): 4.1B: Flammable solid hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Cobalt	7440-48-4	TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	0.02 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		TWA	0.005 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Respiratory sensitization Suspected human carcinogen		

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		TWA	0.02 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Dermal Sensitization Respiratory sensitization Confirmed animal carcinogen with unknown relevance to humans		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Cobalt	7440-48-4	Cobalt	15 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		Cobalt		Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with impervious gloves.

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
Flame retardant antistatic protective clothing.

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Respiratory protection
Recommended Filter type: Filter type P3
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	2,900 °C 5,252 °F - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	The substance or mixture is a flammable solid with the category 1.
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	8.9 g/mL at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 5.0
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available

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r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
Oxidizing agents, Mineral acidsAcetylene, Hydrazinium nitrate, Material readily reacts with acids generating flammable and/or explosive hydrogen gas.

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 6,171 mg/kg
Remarks: Behavioral:Somnolence (general depressed activity).
Behavioral:Ataxia.
Diarrhea
Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Causes serious eye irritation.
(OECD Test Guideline 405)

Respiratory or skin sensitization
May cause allergic respiratory and skin reactions

Germ cell mutagenicity

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Suspected of causing genetic defects.

Carcinogenicity
Presumed to have carcinogenic potential for humans

IARC: 2A - Group 2A: Probably carcinogenic to humans (Cobalt)

2A - Group 2A: Probably carcinogenic to humans (Cobalt)

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
May damage fertility.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: GF8750000
Kidney injury may occur., Damage to the eyes., Lung irritation, Throat., Rash, Vomiting, Diarrhea
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LC50 - Danio rerio (zebra fish) - 100.01 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - > 100 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	static test ErC50 - Pseudokirchneriella subcapitata (green algae) - 0.270 mg/l - 70 h (OECD Test Guideline 201)

12.2 Persistence and degradability
The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

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12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)

UN number: 3089 Class: 4.1 Packing group: II
Proper shipping name: Metal powders, flammable, n.o.s.
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG

UN number: 3089 Class: 4.1 Packing group: II EMS-No: F-G, S-G
Proper shipping name: METAL POWDER, FLAMMABLE, N.O.S.

IATA

UN number: 3089 Class: 4.1 Packing group: II
Proper shipping name: Metal powder, flammable, n.o.s.

SECTION 15: Regulatory information

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

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SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Cobalt	7440-48-4	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

Cobalt	7440-48-4

Pennsylvania Right To Know

Cobalt	7440-48-4

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Cobalt	7440-48-4

Washington Chemicals of High Concern

Cobalt	7440-48-4

California Prop. 65

WARNING: This product can expose you to chemicals including Cobalt, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.
Version: 6.12 Revision Date: 09/08/2024 Print Date: 09/09/2024

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SAFETY DATA SHEET

Version 6.9
Revision Date 09/07/2024
Print Date 09/08/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Copper

Product Number : 349178
Brand : Aldrich
Index-No. : 029-024-00-X
CAS-No. : 7440-50-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Not a hazardous substance or mixture.

2.2 GHS Label elements, including precautionary statements

No hazard pictogram, no signal word, no hazard statement(s), no precautionary statement(s) required.

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2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	Cu
Molecular weight	:	63.55 g/mol
CAS-No.	:	7440-50-8
EC-No.	:	231-159-6
Index-No.	:	029-024-00-X

Component	Classification	Concentration
Copper(bulk)		
		<= 100 %

SECTION 4: First aid measures

4.1 Description of first-aid measures

If inhaled
After inhalation: fresh air.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most). Consult doctor if feeling unwell.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

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5.2 Special hazards arising from the substance or mixture
Copper oxides
Not combustible.
Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters
In the event of fire, wear self-contained breathing apparatus.

5.4 Further information
Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid inhalation of dusts. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert. For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry.

Store under inert gas. Air sensitive.

Storage class
Storage class (TRGS 510): 13: Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

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SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Copper(bulk)	7440-50-8	TWA	1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		TWA	0.2 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	0.1 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Change contaminated clothing. Wash hands after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with impervious gloves.

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm

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Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Respiratory protection
Recommended Filter type: Filter type P2
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Foil
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 1,083.4 °C (1,982.1 °F) - lit.
f)	Initial boiling point and boiling range	2,567 °C 4,653 °F - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	The product is not flammable.
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	8.94 g/mL at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances
p)	Autoignition	No data available

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	temperature	
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Exothermic reaction with:
Ethylene oxide
Fluorine
hydrogen sulphide
halogen-halogen compounds
alkali oxides
nitrides
Salts of hydrazine
Sulfuric acid
Risk of ignition or formation of inflammable gases or vapours with:
Oxidizing agents
Chlorine
Risk of explosion with:
Acetylene
azides
ammonium compounds
iodates
bromopropine
perchlorates
bromates
picrates
chlorates
Peroxides

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

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10.6 Hazardous decomposition products

In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: GL5325000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

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SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

Further information
Not classified as dangerous in the meaning of transport regulations.

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SECTION 15: Regulatory information

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : No SARA Hazards

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know

Copper(bulk) 7440-50-8

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its

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Version: 6.9 Revision Date: 09/07/2024 Print Date: 09/08/2024

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SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Version 7.5
Revision Date 04.03.2024
Print Date 16.09.2024
GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name	:	Cumene
Product Number	:	C87657
Brand	:	Aldrich
Index-No.	:	601-024-00-X
REACH No.	:	A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.	:	98-82-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	:	Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Sigma-Aldrich Inc. 3050 SPRUCE ST ST. LOUIS MO 63103 UNITED STATES
Telephone	:	+1 314 771-5765
Fax	:	+1 800 325-5052

1.4 Emergency telephone

Emergency Phone #	:	800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Flammable liquids, (Category 3)	H226: Flammable liquid and vapor.
Carcinogenicity, (Category 1B)	H350: May cause cancer.

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Specific target organ toxicity - single exposure, (Category 3), Respiratory system	H335: May cause respiratory irritation.
Aspiration hazard, (Category 1)	H304: May be fatal if swallowed and enters airways.
Long-term (chronic) aquatic hazard, (Category 2)	H411: Toxic to aquatic life with long lasting effects.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram



Signal Word	Danger
Hazard Statements	
H226	Flammable liquid and vapor.
H304	May be fatal if swallowed and enters airways.
H335	May cause respiratory irritation.
H350	May cause cancer.
H411	Toxic to aquatic life with long lasting effects.
Precautionary Statements	
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233	Keep container tightly closed.
P273	Avoid release to the environment.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P331	Do NOT induce vomiting.
Supplemental Hazard Statements	none

Reduced Labeling (<= 125 ml)

Pictogram



Signal Word	Danger
Hazard Statements	
H350	May cause cancer.
H304	May be fatal if swallowed and enters airways.
Precautionary Statements	
P202	Do not handle until all safety precautions have been read and understood.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P331	Do NOT induce vomiting.

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Supplemental Hazard Statements none

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Ecological information:
The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.
Toxicological information:
The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.
May form explosive peroxides.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Isopropylbenzene

Formula : C_9H_{12}
Molecular weight : 120,19 g/mol
CAS-No. : 98-82-8
EC-No. : 202-704-5
Index-No. : 601-024-00-X

Component		Classification	Concentration
cumene			
CAS-No. EC-No. Index-No.	98-82-8 202-704-5 601-024-00-X	Flam. Liq. 3; Carc. 1B; STOT SE 3; Asp. Tox. 1; Aquatic Chronic 2; H226, H350, H335, H304, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

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In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2) Foam Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air at elevated temperatures.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

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6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. Keep locked up or in an area accessible only to qualified or authorized persons.

Store under inert gas.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

8.2 Exposure controls

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please

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contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Viton®
Minimum layer thickness: 0,7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0,4 mm
Break through time: 10 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter A (acc. to DIN 3181) for vapours of organic compounds

The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Physical state	liquid, clear
b)	Color	colorless
c)	Odor	aromatic
d)	Melting point/freezing point	Melting point/range: -96 °C - lit.
e)	Initial boiling point and boiling range	152 - 154 °C - lit.
f)	Flammability (solid, gas)	No data available
g)	Upper/lower flammability or explosive limits	Upper explosion limit: 6,0 %(V) Lower explosion limit: 0,9 %(V)
h)	Flash point	31,0 °C - closed cup

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i)	Autoignition temperature	425,0 °C
j)	Decomposition temperature	No data available
k)	pH	Not applicable
l)	Viscosity	Viscosity, kinematic: No data available Viscosity, dynamic: 0,79 mPa.s at 20 °C
m)	Water solubility	ca.0,05 g/l at 25 °C - slightly soluble
n)	Partition coefficient: n-octanol/water	log Pow: 3,55 at 23 °C - Bioaccumulation is not expected.
o)	Vapor pressure	11 hPa at 20,0 °C
p)	Density	0,864 g/mL at 25 °C - lit.
	Relative density	No data available
q)	Relative vapor density	No data available
r)	Particle characteristics	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

Surface tension	27,69 mN/m at 25 °C

SECTION 10: Stability and reactivity

10.1 Reactivity

Vapor/air-mixtures are explosive at intense warming.

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

Heating.

10.5 Incompatible materials

No data available

10.6 Hazardous decomposition products

In the event of fire: see section 5

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SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Symptoms: gastric pain, Vomiting
Symptoms: mucosal irritations, Cough, Shortness of breath, Headache, Nausea, Vomiting,
Possible damages:, damage of respiratory tract
Dermal: No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation
(OECD Test Guideline 404)
Remarks: Drying-out effect resulting in rough and chapped skin.

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation - 72 h
(OECD Test Guideline 405)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473
Result: negative
Test Type: Ames test
Test system: S. typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative
Test Type: unscheduled DNA synthesis assay
Test system: rat hepatocytes
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 482
Result: negative

Test Type: Micronucleus test
Species: Mouse
Cell type: Red blood cells (erythrocytes)
Application Route: inhalation (gas)
Method: OECD Test Guideline 474
Result: negative

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Test Type: Micronucleus test
Species: Rat
Cell type: Bone marrow
Application Route: Intraperitoneal
Method: OECD Test Guideline 474
Result: Positive results were obtained in some in vivo tests.

Carcinogenicity
Presumed to have carcinogenic potential for humans

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
Inhalation - May cause respiratory irritation. - Respiratory Tract
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
Aspiration may cause pulmonary edema and pneumonitis.

11.2 Additional Information

Endocrine disrupting properties

Product:

Assessment	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

RTECS: GR8575000
narcosis, Central nervous system depression, Dermatitis, Gastrointestinal disturbance, Damage to the lungs., Liver injury may occur., Kidney injury may occur.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After uptake of large quantities:

somnolence
Dizziness
narcosis

Effect potentiated by: ethanol

Handle in accordance with good industrial hygiene and safety practice.

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SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Cyprinodon variegatus (sheepshead minnow) - 4,7 mg/l - 96 h (US-EPA)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 2,14 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	static test ErC50 - Desmodesmus subspicatus (green algae) - 2,01 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to bacteria	static test EC50 - activated sludge - > 2.000 mg/l - 3 h (OECD Test Guideline 209)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	semi-static test NOEC - Daphnia magna (Water flea) - 0,35 mg/l - 21 d (OECD Test Guideline 211)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 20 d Result: 70 % - Readily biodegradable. Remarks: (ECHA)

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Endocrine disrupting properties

Product:

Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects

Discharge into the environment must be avoided.

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

No data available

SECTION 14: Transport information

14.1 UN number

ADR/RID: 1918 IMDG: 1918 IATA: 1918

14.2 UN proper shipping name

ADR/RID: ISOPROPYLBENZENE
IMDG: ISOPROPYLBENZENE
IATA: Isopropylbenzene

14.3 Transport hazard class(es)

ADR/RID: 3 IMDG: 3 IATA: 3

14.4 Packaging group

ADR/RID: III IMDG: III IATA: III

14.5 Environmental hazards

ADR/RID: yes IMDG Marine pollutant: yes IATA: no

14.6 Special precautions for user

Tunnel restriction code : (D/E)

Further information : No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

This material safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

Authorisations and/or restrictions on use

REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII) : cumene

National legislation

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.

E2 ENVIRONMENTAL HAZARDS

P5c FLAMMABLE LIQUIDS

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Other regulations
Observe work restrictions regarding maternity protection in accordance to Dir 92/85/EEC or stricter national regulations where applicable.

Take note of Dir 94/33/EC on the protection of young people at work.

15.2 Chemical Safety Assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements

H226	Flammable liquid and vapor.
H304	May be fatal if swallowed and enters airways.
H335	May cause respiratory irritation.
H350	May cause cancer.
H411	Toxic to aquatic life with long lasting effects.

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Full text of other abbreviations

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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AccuStandard, Inc.
125 Market St., New Haven, CT 06513 USA
Tel: 203-786-5290 Fax: 203-786-5287

SAFETY DATA SHEET

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

1.1 - Product Identifiers

Catalog Name: WC-CN-1X-1

Description: Cyanide Standard

1.2 - Relevant Identified Uses of the Substance or Mixture

Laboratory Chemical Reference Material

1.3 - Supplier Details

Company: AccuStandard, Inc.
125 Market St.
New Haven, CT 06513 USA

Telephone Number: 203-786-5290

Fax: 203-786-5287

Email: edocs@accustandard.com

1.4 - Emergency Telephone Number

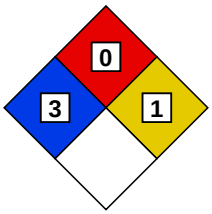
Emergency Phone #: AccuStandard, Inc.
1-203-502-7070 (USA)
+001-203-502-7070 (International)

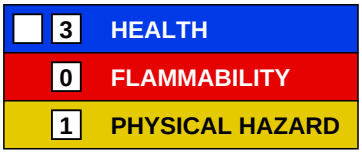
24 hours / 7 days a week

SECTION 2 - HAZARDS IDENTIFICATION

2.1 - GHS Label Elements







Signal Word: Danger

Hazard Codes:

H302 - Harmful if swallowed. (Acute toxicity, oral, category 4)

H314 - Causes skin burns. (Skin corrosion/irritation, category 1)

H318 - Causes serious eye damage. (Eye damage/irritation, category 1)

H332 - Harmful if inhaled. (Acute toxicity, inhalation, category 4)

Precautionary Codes:

P202 - This product should only by used by persons trained in the safe handling of hazardous chemicals.

P233 - Store in a tightly closed container. (P404)

P262 - Do not get in eyes, on skin or clothing.

P264 - Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available.

P280 - Protective gloves must be worn to prevent skin contact.

SECTION 2 - HAZARDS IDENTIFICATION *- continued*

2.1 - GHS Label Elements *- continued*

P284 - Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), or a risk assessment shows air-purifying respirators are appropriate, use of a NIOSH/MSHA approved air supplied respirator is advised. Use a full-face respirator with multi-purpose combination (US) or type ABEK (EN14387) respirator cartridges in absence of proper environmental control. Always use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Engineering and/or administrative controls should be implemented to reduce exposure.

P331 - Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Give victim a glass of water a little at a time. Never give anything by mouth to an unconscious person. If vomiting occurs spontaneously, lower head below waist to prevent fluid from entering the lungs.

P338 - Eye contact: Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers.

P360 - Skin contact: Immediately flush skin with plenty amounts of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Thoroughly wash (or discard) clothing and shoes before reuse.

2.2 - Other Hazards

2.2.1 - Symptom of Exposure Health/Environment

Corrosive.

May cause stomach cramps and gastro-intestinal disturbances.

May cause burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting.

2.2.2 - Potential Health Effects

Causes serious eye damage. (Eye damage/irritation, category 1)

Causes skin burns. (Skin corrosion/irritation, category 1)

May be harmful if absorbed through the skin. (Acute toxicity, dermal, category 5)

Extremely destructive to tissue of the mucous membranes and upper respiratory tract.

Harmful if inhaled. (Acute toxicity, inhalation, category 4)

Harmful if swallowed. (Acute toxicity, oral, category 4)

2.2.3 - Routes of Entry

Inhalation, ingestion or skin contact.

2.2.4 - Carcinogenicity

This product is or contains a component that is not listed (ACGIH, IARC, NTP, OSHA) as a cancer causing agent.

SECTION 3 - COMPOSITION / ANALYTES DATA

Description: Cyanide Standard

			ACGIH -TLV (mg/m³)			OSHA -PEL (mg/m³)		
Analyte	CAS #	% Concentration	TWA	STEL	Skin	TWA	STEL	Skin
Potassium cyanide	151-50-8	0.025			X	5		X
Sodium hydroxide	1310-73-2	2.000	(C)2 (C)2			2		
Water	7732-18-5	97.975						

SECTION 4 - FIRST AID MEASURES

4.2 - Eye Contact

Eye contact: Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. (P338)

4.3 - Skin Contact

Skin contact: Immediately flush skin with plenty amounts of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Thoroughly wash (or discard) clothing and shoes before reuse. (P360)

4.4 - Inhalation

Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek immediate medical attention.

4.5 - Ingestion

Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Give victim a glass of water a little at a time. Never give anything by mouth to an unconscious person. If vomiting occurs spontaneously, lower head below waist to prevent fluid from entering the lungs. (P331)

SECTION 5 - FIRE FIGHTING MEASURES

5.1 - Flammable Properties

During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Reacts with most metals to form flammable hydrogen gas.

5.2 - Extinguishing Media

Do not use water.

Use dry chemical when fighting fires involving this material.

5.3 - Protection of Firefighters

As in any fire, wear self-contained breathing apparatus pressure demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

6.1 - Spill Response

Wear a self-contained breathing apparatus and appropriate Personal protection. Prevent contact with skin or eyes. Ventilate area. Stop leak if you can do so without risk. Absorb on sand or vermiculite, take up and containerize for proper disposal. Flush spill area with water. Comply with Federal, State, and local regulations.

SECTION 7 - HANDLING AND STORAGE

Store in a tightly closed container. (P404)

Keep refrigerated.

Avoid metal containers.

Material is hygroscopic.

Avoid inhalation.

Use with adequate ventilation.

Do not get in eyes, on skin or clothing. (P262)

Avoid prolonged or repeated exposure.

This product should only by used by persons trained in the safe handling of hazardous chemicals. (P202)

SECTION 8 - EXPOSURE CONTROLS

8.1 - Engineering Controls/PPE

Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available. (P264)

8.2 - General Hygene Considerations

Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), or a risk assessment shows air-purifying respirators are appropriate, use of a NIOSH/MSHA approved air supplied respirator is advised. Use a full-face respirator with multi-purpose combination (US) or type ABEK (EN14387) respirator cartridges in absence of proper environmental control. Always use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Engineering and/or administrative controls should be implemented to reduce exposure.

Material should be handled or transferred in an approved fume hood or with adequate ventilation.

Protective gloves must be worn to prevent skin contact. (P280)

(Chloroprene, natural rubber, nitrile, or equivalent)

Wear safety glasses with side shields (or googles) and a face shield.

Use eye protection tested and approved under the appropriate government standards such as NIOSH (US) or EN 166 (EU).

All recommendations are advisory only and must be evaluated by an industrial hygienist and/or safety officer familiar with the specific situation of anticipated use, such as concentration and amount of the substance in the workplace. Any recommendation should not be construed as offering an approval for any specific use of the product.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear liquid

Odor: Practically odorless

Odor Threshold: N/A

pH: 13-14

Melting Point: -4 °C (5% soln)

Boiling Point: 102 °C (5% soln)

Flash Point: N/A

Evaporation Rate (Butyl Acetate=1): N/A

Flammability Class: N/A

Lower Flammability Level: N/A

Upper Flammability Level: N/A

Vapor Pressure: N/A

Vapor Density (Air = 1): >1 g/l

Specific Gravity: 1.05 g/cm3 (5% soln)

Solubility in Water: Soluble

Partition Coefficient: N/A

Autoignition Temperature: N/A

Decomposition Temperature: N/A

Viscosity: N/A

VOC Content: N/A

Percent Volatile: N/A

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable

Materials to Avoid: Oxidizers
Acids

Hazardous Decomposition: Sodium oxides

Hazardous Polymerization: Will not occur

Condition to Avoid: Prolonged exposure to air

SECTION 11 - TOXICOLOGICAL INFORMATION

Human Health Toxicity

See section 2 for specific toxicological information for the ingredients of this product.

LD50 (Oral): N/A

LD50 (Dermal) : N/A

LC50 (Inhalation): N/A

No specific human health toxicity information is available for this product.

No other information related to the toxicological properties of this product is available at this time.

SECTION 12 - ECOLOGICAL INFORMATION

Environmental Toxicity

By complying with sections 6 and 7 there should be no release to the environment.

LC50 (Fish): N/A

EC50 (Aquatic Invertebrate): N/A

BCF: N/A

No specific environmental toxicity information is available for this product.

No other information related to the ecological properties of this product is available at this time.

SECTION 13 - DISPOSAL CONSIDERATIONS

Recycle or incinerate at any EPA approved facility or dispose in compliance with Federal, State and local regulations. Empty containers must be triple-rinsed prior to disposal.

SECTION 14 - TRANSPORT INFORMATION

Transportation Information (DOT/IATA)

UN Number: UN1824

Class: 8

Packing Group: III

Proper Shipping Name: Sodium hydroxide solution

Poison by Inhalation: No

Marine Pollutant: No

SECTION 15 - REGULATORY INFORMATION

This product does not contain compounds subject to EU Regulation (EC) No 1907/2006 (REACH) on Annex XIV, Annex XVII, and/or Article 59.

SECTION 15 - REGULATORY INFORMATION *- continued*

All components are listed on the TSCA Inventory.

For laboratory, research and development use only. Not for manufacturing or commercial purposes.

In addition to federal and state regulations, local regulations may apply. Check with your local regulatory authorities.

SECTION 16 - OTHER INFORMATION

This document has been designed to meet the requirements of OSHA, ANSI, GHS and CHIPs regulations. Chemicals are classified using the Globally Harmonized System for Classification and Labeling of Chemicals and CLP Regulation (EC) No. 1272/2008.

The statements contained herein are offered for informational purposes only and are based on technical data that we believe to be accurate. The manufacturer will not assume any liability for the accuracy and completeness of this information. Final determination of the suitability of the material is the responsibility of the user. Although certain hazards are described herein, the user should not presume that these are the only hazards that exist. Since conditions and manner of use are outside of the manufacturers control, we make

NO WARRANTY OF MERCHANTABILITY, EXPRESSED OR IMPLIED, AND ASSUME NO LIABILITY RESULTING FROM ITS USE.

Legend : N/A = Not Available ND = Not Determined NR = Not Regulated

Alteration of any information contained herein without written permission from the manufacturer is strictly prohibited.

HMIS/NFPA HAZARD INDEX

0 - Minimal
1 - Slight
2 - Moderate
3 - Serious
4 - Severe

* - Additional Hazard

GHS HAZARD INDEX

Category 1 - Most Severe
Category 5 - Least Severe

**** End of Document ****

SAFETY DATA SHEET

Version 5.8
Revision Date 03/07/2015
Print Date 02/23/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Cyclohexane

Product Number : 320633
Brand : Aldrich
Index-No. : 601-017-00-1

CAS-No. : 110-82-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Skin irritation (Category 2), H315
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Aspiration hazard (Category 1), H304
Acute aquatic toxicity (Category 1), H400

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H304 May be fatal if swallowed and enters airways.
H315 Causes skin irritation.
H336 May cause drowsiness or dizziness.
H400 Very toxic to aquatic life.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.

P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	C_6H_{12}
Molecular weight	:	84.16 g/mol
CAS-No.	:	110-82-7
EC-No.	:	203-806-2
Index-No.	:	601-017-00-1

Hazardous components

Component	Classification	Concentration
Cyclohexane		
	Flam. Liq. 2; Skin Irrit. 2; STOT SE 3; Asp. Tox. 1; Aquatic Acute 1; H225, H304, H315, H336, H400	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Cyclohexane	110-82-7	TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment		
		TWA	300.000000 ppm 1,050.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	300.000000 ppm 1,050.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 480 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 35 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 4 - 7 °C (39 - 45 °F) - lit.
f)	Initial boiling point and boiling range	80.7 °C (177.3 °F) - lit.
g)	Flash point	-17.99 °C (-0.38 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 9 %(V) Lower explosion limit: 1 %(V)
k)	Vapour pressure	225.0 hPa (168.8 mmHg) at 37.7 °C (99.9 °F) 102.7 hPa (77.0 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.779 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 3.44
p)	Auto-ignition temperature	260.0 °C (500.0 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Vapours may form explosive mixture with air.

10.4 Conditions to avoid

Heat, flames and sparks.

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 12,705 mg/kg

LC50 Inhalation - Rat - 4 h - 34,000 mg/l
(OECD Test Guideline 403)

LD50 Dermal - Rabbit - > 2,000 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
May be fatal if swallowed and enters airways.

Additional Information
RTECS: GU6300000

Central nervous system depression, Drowsiness, Irritability, Dizziness, Gastrointestinal disturbance, Lung irritation, chest pain, pulmonary edema

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Pimephales promelas (fathead minnow) - 4.53 mg/l -

	96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 0.9 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	EC50 - Pseudokirchneriella subcapitata (green algae) - 3.4 mg/l - 72 h (OECD Test Guideline 201)

12.2 Persistence and degradability

Biodegradability Result: - Readily biodegradable

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1145 Class: 3 Packing group: II
Proper shipping name: Cyclohexane
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

IMDG

UN number: 1145 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: CYCLOHEXANE
Marine pollutant:yes

IATA

UN number: 1145 Class: 3 Packing group: II
Proper shipping name: Cyclohexane

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Cyclohexane	110-82-7	2007-07-01

SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Cyclohexane	110-82-7	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Cyclohexane	110-82-7	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Cyclohexane	110-82-7	2007-07-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Asp. Tox.	Aspiration hazard
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H336	May cause drowsiness or dizziness.
H400	Very toxic to aquatic life.
Skin Irrit.	Skin irritation
STOT SE	Specific target organ toxicity - single exposure

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.8 Revision Date: 03/07/2015 Print Date: 02/23/2016

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acc. to OSHA HCS

Printing date 01/15/2024 Revision date 01/15/2024

*

1 Identification

· **Product identifier**

· **Trade name: p,p'-DDE**
· **Synonym**
1,1'-(2,2-dichloroethenylidene)bis[4-chloro-benzene]
4,4'-DDE
4,4'-Dichlorodiphenyldichloroethylene
p,p'-Dichlorodiphenyldichloroethylene
NSC 1153

· **Article number:** 24241
· **CAS Number:**
72-55-9
· **EC number:**
200-784-6
· **Application of the substance / the mixture**
This product is for research use - Not for human or veterinary diagnostic or therapeutic use.

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
Cayman Chemical Co.
1180 E. Ellsworth Rd.
Ann Arbor, MI 48108
USA

· **Information department:** Product safety department
· **Emergency telephone number:**
During normal opening times: +1 (734) 971-3335
US/CANADA: 800-424-9300
Outside US/CANADA: 703-741-5970

2 Hazard(s) identification

· **Classification of the substance or mixture**


GHS06 Skull and crossbones

Acute Toxicity - Oral 3 H301 Toxic if swallowed.


GHS08 Health hazard

Carcinogenicity 2 H351 Suspected of causing cancer.

Specific Target Organ Toxicity - Repeated Exposure 1 H372 Causes damage to organs through prolonged or repeated exposure.

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GHS09 Environment

Aquatic Acute 1 H400 Very toxic to aquatic life.
Aquatic Chronic 1 H410 Very toxic to aquatic life with long lasting effects.

· **Label elements**
· **GHS label elements**
The substance is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms**



GHS06 GHS08 GHS09

· **Signal word** Danger
· **Hazard statements**
H301 Toxic if swallowed.
H351 Suspected of causing cancer.
H372 Causes damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.
· **Precautionary statements**
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe dust/fume/gas/mist/vapors/spray.
P264 Wash thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P273 Avoid release to the environment.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P301+P310 If swallowed: Immediately call a poison center/doctor.
P321 Specific treatment (see on this label).
P330 Rinse mouth.
P308+P313 IF exposed or concerned: Get medical advice/attention.
P314 Get medical advice/attention if you feel unwell.
P391 Collect spillage.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.
· **Classification system:**
· **NFPA ratings (scale 0 - 4)**



Health = 1
Fire = 0
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**



Health = 1
Fire = 0
Reactivity = 0

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· **Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

3 Composition/information on ingredients

· **Chemical characterization: Substances**
· **CAS No. Description**
72-55-9 p,p'-DDE
· **Identification number(s)**
· **EC number:** 200-784-6

4 First-aid measures

· **Description of first aid measures**
· **General information:**
Immediately remove any clothing soiled by the product.
Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
In case of irregular breathing or respiratory arrest provide artificial respiration.
· **After inhalation:** In case of unconsciousness place patient stably in side position for transportation.
· **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
· **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
· **After swallowing:** Do not induce vomiting; immediately call for medical help.
· **Information for doctor:**
· **Most important symptoms and effects, both acute and delayed**
No further relevant information available.
· **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:**
Use fire fighting measures that suit the environment.
A solid water stream may be inefficient.
· **Special hazards arising from the substance or mixture** No further relevant information available.
· **Advice for firefighters**
· **Protective equipment:** No special measures required.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures** Not required.
· **Environmental precautions:**
Inform respective authorities in case of seepage into water course or sewage system.
Do not allow to enter sewers/ surface or ground water.
· **Methods and material for containment and cleaning up:**
Dispose contaminated material as waste according to section 13.

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· **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
· **Protective Action Criteria for Chemicals**
· **PAC-1:** 6.5 mg/m³
· **PAC-2:** 72 mg/m³
· **PAC-3:** 170 mg/m³

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7 Handling and storage

· **Handling:**
· **Precautions for safe handling** Thorough dedusting.
· **Information about protection against explosions and fires:** No special measures required.

· **Conditions for safe storage, including any incompatibilities**
· **Storage:** Store in accordance with information listed on the product insert.
· **Requirements to be met by storerooms and receptacles:** No special requirements.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:** None.
· **Specific end use(s)** No further relevant information available.

8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see section 7.

· **Control parameters**
· **Components with limit values that require monitoring at the workplace:** Not required.
· **Additional information:** The lists that were valid during the creation were used as basis.

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
· **Breathing equipment:**
In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.
· **Protection of hands:**



Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation
· **Material of gloves**
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.

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· **Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
· **Eye protection:**



Tightly sealed goggles

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9 Physical and chemical properties

· **Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Solid
Color:	Not determined.
· **Odor:**	Characteristic
· **Structural Formula**	C14H8Cl4
· **Molecular Weight**	318 g/mol
· **Odor threshold:**	Not determined.
· **pH-value:**	Not applicable.
· **Change in condition**	
Melting point/Melting range:	Undetermined.
Boiling point/Boiling range:	Undetermined.
· **Flash point:**	Not applicable.
· **Flammability (solid, gaseous):**	Product is not flammable.
· **Decomposition temperature:**	Not determined.
· **Ignition temperature:**	Not determined.
· **Danger of explosion:**	Product does not present an explosion hazard.
· **Explosion limits:**	
Lower:	Not determined.
Upper:	Not determined.
· **Vapor pressure:**	Not applicable.
· **Density:**	Not determined.
· **Relative density**	Not determined.
· **Vapor density**	Not applicable.
· **Evaporation rate**	Not applicable.
· **Solubility in / Miscibility with**	
Water:	Not determined.
· **Partition coefficient (n-octanol/water):**	Not determined.
· **Viscosity:**	
Dynamic:	Not applicable.
Kinematic:	Not applicable.
SOLUBILITY	Chloroform: Slightly Soluble

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· **Other information** No further relevant information available.

10 Stability and reactivity

· **Reactivity** No further relevant information available.
· **Chemical stability**
· **Thermal decomposition / conditions to be avoided:**
No decomposition if used according to specifications.
· **Possibility of hazardous reactions** No dangerous reactions known.
· **Conditions to avoid** No further relevant information available.
· **Incompatible materials:** strong bases, strong oxidizing agents
· **Hazardous decomposition products:** carbon oxides, hydrogen chloride

11 Toxicological information

· **RTECS Number** KV9450000
· **Information on toxicological effects**
· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**		
Oral	LD50	880 mg/kg (rat)
	Intraperitoneal LD50	500 µg/kg (mouse)
	Intraperitoneal LD50	159 mg/kg (rat)

· **Primary irritant effect:**
· **on the skin:** No irritant effect.
· **on the eye:** No irritating effect.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**

· **Carcinogenic categories**
· **IARC (International Agency for Research on Cancer)** Substance is not listed.
· **NTP (National Toxicology Program)** Substance is not listed.
· **OSHA-Ca (Occupational Safety & Health Administration)** Substance is not listed.

12 Ecological information

· **Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **Persistence and degradability** No further relevant information available.
· **Behavior in environmental systems:**
· **Bioaccumulative potential** No further relevant information available.
· **Mobility in soil** No further relevant information available.
· **Ecotoxical effects:**
· **Remark:** Very toxic for fish
· **Additional ecological information:**
· **General notes:**
Water hazard class 3 (Assessment by list): extremely hazardous for water
Do not allow product to reach ground water, water course or sewage system, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.
Also poisonous for fish and plankton in water bodies.

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Very toxic for aquatic organisms
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

· **Uncleaned packagings:**
· **Recommendation:** Disposal must be made according to official regulations.

14 Transport information

· **UN-Number**	
· **DOT, IMDG, IATA**	UN2811
· **UN proper shipping name**	
· **DOT**	Toxic solids, organic, n.o.s. (p,p'-DDE)
· **IMDG**	TOXIC SOLID, ORGANIC, N.O.S. (p,p'-DDE)
· **IATA**	Toxic solid, organic, n.o.s. (p,p'-DDE)
· **Transport hazard class(es)**	
· **DOT**	
· **Class**	6.1 Toxic substances
· **Label**	6.1
· **IMDG, IATA**	
· **Class**	6.1 Toxic substances
· **Label**	6.1
· **Packing group**	
· **DOT, IMDG, IATA**	III
· **Environmental hazards:**	Environmentally hazardous substance, solid
· **Special precautions for user**	Warning: Toxic substances
· **Hazard identification number (Kemler code):**	60
· **EMS Number:**	F-A,S-A

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· **Stowage Category**	A
· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **Transport/Additional information:**	
· **DOT**	
· **Quantity limitations**	On passenger aircraft/rail: 100 kg On cargo aircraft only: 200 kg
· **Hazardous substance:**	1 lbs, 0.454 kg
· **IMDG**	
· **Limited quantities (LQ)**	5 kg
· **Excepted quantities (EQ)**	Code: E1 Maximum net quantity per inner packaging: 30 g Maximum net quantity per outer packaging: 1000 g
· **IATA**	
· **Remarks:**	When sold in quantities of less than or equal to 1 mL, or 1 g, with an Excepted Quantity Code of E1, E2, E4, or E5, this item meets the De Minimis Quantities exemption, per IATA 2.6.10. Therefore packaging does not have to be labeled as Dangerous Goods/Excepted Quantity.
· **UN "Model Regulation":**	UN 2811 TOXIC SOLID, ORGANIC, N.O.S. (P,P'-DDE), 6.1, III, ENVIRONMENTALLY HAZARDOUS

15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**
No further relevant information available.
· **Sara**
· **Section 355 (extremely hazardous substances):** Substance is not listed.
· **Section 313 (Specific toxic chemical listings):** Substance is not listed.
· **TSCA (Toxic Substances Control Act):** Substance is not listed.
· **Hazardous Air Pollutants** Substance is not listed.
· **Proposition 65**
· **Chemicals known to cause cancer:** Substance is listed.
· **Chemicals known to cause reproductive toxicity for females:** Substance is not listed.
· **Chemicals known to cause reproductive toxicity for males:** Substance is listed.
· **Chemicals known to cause developmental toxicity:** Substance is listed.

· **Carcinogenic categories**
· **EPA (Environmental Protection Agency)** B2
· **TLV (Threshold Limit Value)** Substance is not listed.
· **NIOSH-Ca (National Institute for Occupational Safety and Health)** Substance is not listed.
· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

All chemicals may pose unknown hazards and should be used with caution. This SDS applies only to the material as packaged. If this product is combined with other materials, deteriorates, or becomes contaminated, it may pose hazards not mentioned in this SDS. Cayman Chemical Company assumes no responsibility for incidental or consequential damages, including lost profits, arising from the use of

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these data. It shall be the user's responsibility to develop proper methods of handling and personal protection based on the actual conditions of use. While this SDS is based on technical data judged to be reliable, Cayman Chemical Company assumes no responsibility for the completeness or accuracy of the information contained herein.

· **Department issuing SDS:** Environment protection department.
· **Contact:** -
· **Date of preparation / last revision** 01/15/2024
· **Abbreviations and acronyms:**
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety & Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
Acute Toxicity - Oral 3: Acute toxicity – Category 3
Carcinogenicity 2: Carcinogenicity – Category 2
Specific Target Organ Toxicity - Repeated Exposure 1: Specific target organ toxicity (repeated exposure) – Category 1
Aquatic Acute 1: Hazardous to the aquatic environment - acute aquatic hazard – Category 1
Aquatic Chronic 1: Hazardous to the aquatic environment - long-term aquatic hazard – Category 1
· *** Data compared to the previous version altered.**

Safety Data Sheet
acc. to OSHA HCS

Printing date 03/26/2019 Version Number 2 Reviewed on 03/26/2019

*

1 Identification

· **Product identifier**

· **Trade name: p,p'-DDT**

· **Part number:** FRSP-180J
· **CAS Number:**
50-29-3
· **EC number:**
200-024-3
· **Index number:**
602-045-00-7
· **Application of the substance / the mixture** Reagents and Standards for Analytical Chemical Laboratory Use

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
Agilent Technologies, Inc.
5301 Stevens Creek Blvd.
Santa Clara, CA 95051 USA

· **Information department:**
Telephone: 800-227-9770
e-mail: pdl-msds_author@agilent.com
· **Emergency telephone number:** CHEMTREC®: 1-800-424-9300

2 Hazard(s) identification

· **Classification of the substance or mixture**



GHS06 Skull and crossbones

Acute Tox. 3 H301 Toxic if swallowed.
Acute Tox. 3 H311 Toxic in contact with skin.



GHS08 Health hazard

Carc. 2 H351 Suspected of causing cancer.
STOT RE 1 H372 Causes damage to organs through prolonged or repeated exposure.

· **Label elements**
· **GHS label elements** The substance is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms**



GHS06



GHS08

· **Signal word** Danger

· **Hazard-determining components of labeling:**
DDT (common name not adopted by ISO)
· **Hazard statements**
Toxic if swallowed or in contact with skin.

(Contd. on page 2)

Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 1)

Suspected of causing cancer.
Causes damage to organs through prolonged or repeated exposure.

· **Precautionary statements**
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe dust/fume/gas/mist/vapors/spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Wear protective gloves/protective clothing/eye protection/face protection.
If swallowed: Immediately call a poison center/doctor.
Specific treatment (see on this label).
Rinse mouth.
If on skin: Wash with plenty of water.
IF exposed or concerned: Get medical advice/attention.
Call a poison center/doctor if you feel unwell.
Get medical advice/attention if you feel unwell.
Take off immediately all contaminated clothing and wash it before reuse.
Store locked up.
Dispose of contents/container in accordance with local/regional/national/international regulations.

· **Classification system:**
· **NFPA ratings (scale 0 - 4)**



Health = 2
Fire = 2
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**



Health = 2
Fire = 2
Reactivity = 0

· **Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

3 Composition/information on ingredients

· **Chemical characterization: Substances**
· **CAS No. Description**
50-29-3 DDT (common name not adopted by ISO)
· **Identification number(s)**
· **EC number:** 200-024-3
· **Index number:** 602-045-00-7

(Contd. on page 3)

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4 First-aid measures

· **Description of first aid measures**
· **General information:**
Immediately remove any clothing soiled by the product.
Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
In case of irregular breathing or respiratory arrest provide artificial respiration.
· **After inhalation:** In case of unconsciousness place patient stably in side position for transportation.
· **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
· **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
· **After swallowing:** Do not induce vomiting; immediately call for medical help.
· **Information for doctor:**
· **Most important symptoms and effects, both acute and delayed** No further relevant information available.
· **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:**
CO2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
· **Special hazards arising from the substance or mixture**
During heating or in case of fire poisonous gases are produced.
· **Advice for firefighters**
· **Protective equipment:** Mouth respiratory protective device.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures** Mount respiratory protective device.
· **Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
· **Methods and material for containment and cleaning up:**
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
· **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
· **Protective Action Criteria for Chemicals**

· **PAC-1:**
3 mg/m³
· **PAC-2:**
34 mg/m³
· **PAC-3:**
210 mg/m³

(Contd. on page 4)

(Contd. of page 3)

7 Handling and storage

· **Handling:**
· **Precautions for safe handling**
Thorough dedusting.
Ensure good ventilation/exhaustion at the workplace.
Open and handle receptacle with care.
· **Information about protection against explosions and fires:** Keep respiratory protective device available.

· **Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** No special requirements.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:** Keep receptacle tightly sealed.
· **Specific end use(s)** No further relevant information available.

*

8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see item 7.

· **Control parameters**

· **Components with limit values that require monitoring at the workplace:**	
50-29-3 DDT (common name not adopted by ISO)	
PEL	Long-term value: 1 mg/m³ Skin
REL	Long-term value: 0.5 mg/m³ See Pocket Guide App. A
TLV	Long-term value: 1 mg/m³

· **Additional information:** The lists that were valid during the creation were used as basis.

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
Avoid contact with the eyes and skin.
· **Breathing equipment:**
When used as intended with Agilent instruments, the use of the product under normal laboratory conditions and with standard practices does not result in significant airborne exposures and therefore respiratory protection is not needed.
Under an emergency condition where a respirator is deemed necessary, use a NIOSH or equivalent approved device/equipment with appropriate organic or acid gas cartridge.
· **Protection of hands:**
Although not recommended for constant contact with the chemicals or for clean-up, nitrile gloves 11-13 mil thickness are recommended for normal use. The breakthrough time is 1 hr. For cleaning a spill where there is direct contact of the chemical, butyl rubber gloves are recommended 12-15 mil thickness with breakthrough times exceeding 4 hrs. Supplier recommendations should be followed.

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acc. to OSHA HCS

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· **Material of gloves**
For normal use: nitrile rubber, 11-13 mil thickness
For direct contact with the chemical: butyl rubber, 12-15 mil thickness
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.
· **Penetration time of glove material**
For normal use: nitrile rubber: 1 hour
For direct contact with the chemical: butyl rubber: >4 hours
· **Eye protection:**



Tightly sealed goggles

*
9 Physical and chemical properties

· **Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Solid
Color:	Not determined.
· **Odor:**	Characteristic
· **Odor threshold:**	Not determined.
· **pH-value:**	Not applicable.
· **Change in condition**	
Melting point/Melting range:	107-110 °C (224.6-230 °F)
Boiling point/Boiling range:	260 °C (500 °F)
· **Flash point:**	72-77 °C (161.6-170.6 °F)
· **Flammability (solid, gaseous):**	Product is not flammable.
· **Decomposition temperature:**	Not determined.
· **Auto igniting:**	Not determined.
· **Danger of explosion:**	Product does not present an explosion hazard.
· **Explosion limits:**	
Lower:	Not determined.
Upper:	Not determined.
· **Vapor pressure at 20 °C (68 °F):**	0.0000016 hPa (0 mm Hg)
· **Density at 20 °C (68 °F):**	0.99 g/cm³ (8.26155 lbs/gal)
· **Relative density**	Not determined.
· **Vapor density**	Not applicable.
· **Evaporation rate**	Not applicable.
· **Solubility in / Miscibility with**	
Water at 20 °C (68 °F):	0.0000012 g/l
· **Partition coefficient (n-octanol/water):**	Not determined.

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Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 5)

· **Viscosity:**	
Dynamic:	Not applicable.
Kinematic:	Not applicable.
VOC content:	0.00 % 0.0 g/l / 0.00 lb/gal
Solids content:	100.0 %
· **Other information**	No further relevant information available.

10 Stability and reactivity

· **Reactivity** No further relevant information available.
· **Chemical stability**
· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
· **Possibility of hazardous reactions** No dangerous reactions known.
· **Conditions to avoid** No further relevant information available.
· **Incompatible materials:** No further relevant information available.
· **Hazardous decomposition products:** No dangerous decomposition products known.

11 Toxicological information

· **Information on toxicological effects**
· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**

ATE (Acute Toxicity Estimate)		
Oral	LD50	87 mg/kg (rat)
Dermal	LD50	300 mg/kg (rabbit)

50-29-3 DDT (common name not adopted by ISO)		
Oral	LD50	87 mg/kg (rat)
Dermal	LD50	2,510 mg/kg (rat)
		300 mg/kg (rabbit)

· **Primary irritant effect:**
· **on the skin:** No irritant effect.
· **on the eye:** No irritating effect.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**
2A

· **NTP (National Toxicology Program)**
R

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acc. to OSHA HCS

(Contd. of page 6)

· **OSHA-Ca (Occupational Safety & Health Administration)**

Substance is not listed.

12 Ecological information

· **Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **Persistence and degradability** No further relevant information available.
· **Behavior in environmental systems:**
· **Bioaccumulative potential** No further relevant information available.
· **Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Water hazard class 3 (Assessment by list): extremely hazardous for water
Do not allow product to reach ground water, water course or sewage system, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

· **Uncleaned packagings:**
· **Recommendation:** Disposal must be made according to official regulations.

*
14 Transport information

· **UN-Number**
· **DOT, IMDG, IATA** UN2811

· **UN proper shipping name**
· **DOT** Toxic solids, organic, n.o.s. (DDT (common name not adopted by ISO))
· **IMDG, IATA** TOXIC SOLID, ORGANIC, N.O.S. (DDT (common name not adopted by ISO))

· **Transport hazard class(es)**

· **DOT, IMDG, IATA**



· **Class** 6.1 Toxic substances

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Trade name: p,p'-DDT

(Contd. of page 7)

· **Label**	6.1
· **Packing group** · **DOT, IMDG, IATA**	III
· **Environmental hazards:**	Not applicable.
· **Special precautions for user** · **Danger code (Kemler):** · **EMS Number:** · **Stowage Category**	Warning: Toxic substances 60 F-A,S-A A
· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **Transport/Additional information:**	
· **DOT**	
· **Quantity limitations**	On passenger aircraft/rail: 100 kg On cargo aircraft only: 200 kg
· **Hazardous substance:**	1 lbs, 0.454 kg
· **IMDG**	
· **Limited quantities (LQ)**	5 kg
· **Excepted quantities (EQ)**	Code: E1 Maximum net quantity per inner packaging: 30 g Maximum net quantity per outer packaging: 1000 g
· **UN "Model Regulation":**	UN 2811 TOXIC SOLID, ORGANIC, N.O.S. (DDT (COMMON NAME NOT ADOPTED BY ISO)), 6.1, III, ENVIRONMENTALLY HAZARDOUS

15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **Sara**

· **Section 355 (extremely hazardous substances):**
Substance is not listed.

· **Section 313 (Specific toxic chemical listings):**
Substance is not listed.

· **TSCA (Toxic Substances Control Act):**
Substance is listed.

· **TSCA new (21st Century Act): (Substances not listed)**

50-29-3	DDT (common name not adopted by ISO)

· **Proposition 65**

· **Chemicals known to cause cancer:**
Substance is listed.

· **Chemicals known to cause reproductive toxicity for females:**
Substance is listed.

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acc. to OSHA HCS

(Contd. of page 8)

· **Chemicals known to cause reproductive toxicity for males:**
Substance is listed.

· **Chemicals known to cause developmental toxicity:**
Substance is listed.

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**
B2

· **TLV (Threshold Limit Value established by ACGIH)**
A3

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
Substance is listed.

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

*
16 Other information

The information contained in this document is based on Agilent's state of knowledge at the time of preparation. No warranty as to its accurateness, completeness or suitability for a particular purpose is expressed or implied.

· **Date of preparation / last revision** 03/26/2019 / 1

· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
VOC: Volatile Organic Compounds (USA, EU)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety & Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
Acute Tox. 3: Acute toxicity – Category 3
Carc. 2: Carcinogenicity – Category 2
STOT RE 1: Specific target organ toxicity (repeated exposure) – Category 1

· *** Data compared to the previous version altered.**

SAFETY DATA SHEET

Version 5.5
Revision Date 06/02/2016
Print Date 11/17/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : δ-BHC

Product Number : 48495
Brand : Supelco
Index-No. : 602-042-00-0

CAS-No. : 319-86-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Dermal (Category 4), H312
Carcinogenicity (Category 2), H351
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H301 Toxic if swallowed.
H312 Harmful in contact with skin.
H351 Suspected of causing cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.

P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P302 + P352 + P312	IF ON SKIN: Wash with plenty of water.Call a POISON CENTER/doctor if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P363	Wash contaminated clothing before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : δ-1,2,3,4,5,6-Hexachlorocyclohexane

Formula : C6H6Cl6
Molecular weight : 290.8 g/mol
CAS-No. : 319-86-8
EC-No. : 206-272-9
Index-No. : 602-042-00-0

Hazardous components

Component	Classification	Concentration
1α,2α,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane		
	Acute Tox. 3; Acute Tox. 4; Carc. 2; Aquatic Acute 1; Aquatic Chronic 1; H301, H312, H351, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.
Hazardous components without workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available

n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 1,000 mg/kg

Inhalation: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC: 2B - Group 2B: Possibly carcinogenic to humans (1α,2α,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)

NTP: Reasonably anticipated to be a human carcinogen (1α,2α,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: GV4550000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Central nervous system -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - other fish - 2.83 mg/l - 96.0 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Bioaccumulation other fish - 33 d
- 0.955 mg/l

Bioconcentration factor (BCF): 326

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (1α,2α,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)
Reportable Quantity (RQ): 1 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (1α,2α,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (1α,2α,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
1α,2α,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane	319-86-8	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1α,2α,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane	319-86-8	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
1α,2α,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane	319-86-8	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
1α,2α,3α,4β,5α,6β)-1,2,3,4,5,6-Hexachlorocyclohexane	319-86-8	2015-08-14

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity

Carc.	Carcinogenicity
H301	Toxic if swallowed.
H312	Harmful in contact with skin.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	1
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.5 Revision Date: 06/02/2016 Print Date: 11/17/2016

SAFETY DATA SHEET

Version 6.9
Revision Date 03/04/2024
Print Date 07/13/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Dibenz[*a*,*h*]anthracene

Product Number : 48574
Brand : Supelco
Index-No. : 601-041-00-2
CAS-No. : 53-70-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Carcinogenicity (Category 1B), H350
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

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For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Danger

Hazard Statements

H350	May cause cancer.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : 1,2:5,6-Dibenzanthracene

Formula : $C_{22}H_{14}$
Molecular weight : 278.35 g/mol
CAS-No. : 53-70-3
EC-No. : 200-181-8
Index-No. : 601-041-00-2

Component	Classification	Concentration
Dibenz[a,h]anthracene		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H400, H410 Concentration limits: >= 0.01 %: Carc. 1B, H350; M-Factor - Aquatic Acute: 1 - Aquatic Chronic: 100	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

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SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Prevent fire extinguishing water from contaminating surface water or the ground water system.

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SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class
Storage class (TRGS 510): 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

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Component	CAS-No.	Value	Control parameters	Basis
Dibenz[a,h]anthracene	53-70-3	PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Dibenz[a,h]anthracene	53-70-3	1-Hydroxypyrene	2.5 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		3-hydroxybenzo(a)pyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This

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recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter type P3
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 262 - 265 °C (504 - 509 °F) - lit.
f)	Initial boiling point and boiling range	524 °C 975 °F - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	No data available
	Relative density	No data available
n)	Water solubility	No data available

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o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Violent reactions possible with:
strong oxidising agents

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
No data available

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Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
Presumed to have carcinogenic potential for humans

IARC: 2A - Group 2A: Probably carcinogenic to humans (Dibenz[a,h]anthracene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Dibenz[a,h]anthracene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: HN2625000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Lungs -

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.496 mg/l - 48 h Remarks: (ECOTOX Database)
Toxicity to algae	NOEC - Raphidocelis subcapitata (freshwater green alga) - 0.00033 mg/l - 72 h Remarks: (ECOTOX Database)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

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12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
Discharge into the environment must be avoided.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Dibenz[a,h]anthracene)
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Dibenz[a,h]anthracene)
Marine pollutant : yes
Marine pollutant : no

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Dibenz[a,h]anthracene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

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SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Dibenz[a,h]anthracene	53-70-3	1993-02-16

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Dibenz[a,h]anthracene	53-70-3	1993-02-16

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Dibenz[a,h]anthracene	53-70-3	1993-02-16

California Prop. 65 Components

, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.Dibenz[a,h]anthracene	CAS-No. 53-70-3	Revision Date 2007-09-28

SECTION 16: Other information

Further information
The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
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The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.
Version: 6.9 Revision Date: 03/04/2024 Print Date: 07/13/2024

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SAFETY DATA SHEET

Version 3.7
Revision Date 11/25/2014
Print Date 01/29/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Dibenzofuran

Product Number : 236373
Brand : Aldrich

CAS-No. : 132-64-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Acute aquatic toxicity (Category 2), H401
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H302 Harmful if swallowed.
H411 Toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P273 Avoid release to the environment.
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P391 Collect spillage.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : Diphenylene oxide

Formula : $C_{12}H_8O$
Molecular weight : 168.19 g/mol
CAS-No. : 132-64-9
EC-No. : 205-071-3

Hazardous components

Component	Classification	Concentration
Dibenzofuran		
	Acute Tox. 4; Aquatic Acute 2; Aquatic Chronic 2; H302, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Carbon oxides

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an

industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator.For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: crystalline Colour: white, beige
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 80 - 82 °C (176 - 180 °F) - lit.
f)	Initial boiling point and boiling range	154 - 155 °C (309 - 311 °F) at 27 hPa (20 mmHg) - lit.
g)	Flash point	130.0 °C (266.0 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 3.77
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
The preceding data, or interpretation of data, was determined using Quantitative Structure Activity Relationship (QSAR) modeling.

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: HP4430000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	NOEC - Cyprinodon variegatus (sheepshead minnow) - 1 mg/l - 96.0 h
	LC50 - Pimephales promelas (fathead minnow) - 1.05 mg/l - 96.0 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Dibenzofuran)
Reportable Quantity (RQ): 100 lbs
Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Dibenzofuran)
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Dibenzofuran)

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date

Dibenzofuran	132-64-9	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Dibenzofuran	132-64-9	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Dibenzofuran	132-64-9	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Dibenzofuran	132-64-9	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H302	Harmful if swallowed.
H401	Toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	
Flammability:	1
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	1
Reactivity Hazard:	0

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.7 Revision Date: 11/25/2014 Print Date: 01/29/2016

SAFETY DATA SHEET

Version 3.11
Revision Date 03/03/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Dibutyl phthalate

Product Number : 152439
Brand : Aldrich
Index-No. : 607-318-00-4

CAS-No. : 84-74-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Reproductive toxicity (Category 1B), H360
Acute aquatic toxicity (Category 1), H400

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H360 May damage fertility or the unborn child.
H400 Very toxic to aquatic life.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P273 Avoid release to the environment.
P281 Use personal protective equipment as required.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P391 Collect spillage.
P405 Store locked up.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	n-Butyl phthalate Phthalic acid dibutyl ester DBP
Formula	:	$C_{16}H_{22}O_4$
Molecular weight	:	278.34 g/mol
CAS-No.	:	84-74-2
EC-No.	:	201-557-4
Index-No.	:	607-318-00-4
Registration number	:	01-2119493042-44-XXXX

Hazardous components

Component	Classification	Concentration
Dibutyl phthalate Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)		
	Repr. 1B; Aquatic Acute 1; H360, H400	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Dibutyl phthalate	84-74-2	TWA	5.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation Eye irritation Testicular damage		
		TWA	5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Eye irritation Testicular damage		
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 480 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact
Material: Nature latex/chloroprene
Minimum layer thickness: 0.6 mm
Break through time: 120 min
Material tested:Lapren® (KCL 706 / Aldrich Z677558, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -35 °C (-31 °F) - lit.
f)	Initial boiling point and boiling range	340 °C (644 °F) - lit.
g)	Flash point	171.0 °C (339.8 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower	Lower explosion limit: 0.47 %(V)

	flammability or explosive limits	
k)	Vapour pressure	1.3 hPa (1.0 mmHg) at 147.0 °C (296.6 °F)
l)	Vapour density	No data available
m)	Relative density	1.043 g/cm3 at 25 °C (77 °F)
n)	Water solubility	0.0114 g/l at 25 °C (77 °F) - OECD Test Guideline 105 - slightly soluble
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	402.0 °C (755.6 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	18.8 mm2/s at 20 °C (68 °F) -
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Nitrates, Bases, acids, Chlorine

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 8,000 mg/kg

LC50 Inhalation - Rat - 4,250 mg/m3

LD50 Dermal - Rabbit - > 20,860 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitisation
Maximisation Test (GPMT) - Guinea pig
Result: Does not cause skin sensitisation.
(OECD Test Guideline 406)

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
Presumed human reproductive toxicant

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: TI0875000

Nausea, Dizziness, Headache, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Central nervous system -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 0.85 mg/l - 96.0 h
	NOEC - Pimephales promelas (fathead minnow) - 0.32 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 3.7 mg/l - 48 h

12.2 Persistence and degradability

Biodegradability	Result: 81 % - Readily biodegradable (C.4-C of the COUNCIL REGULATION (EC) No 440/2008)

12.3 Bioaccumulative potential

Bioaccumulation	Pimephales promelas (fathead minnow) - 11 d - 0.0348 mg/l Bioconcentration factor (BCF): 2,165 Remarks: Does not bioaccumulate.

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 3082 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, liquid, n.o.s. (Dibutyl phthalate)
Reportable Quantity (RQ): 10 lbs
Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG

UN number: 3082 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Dibutyl phthalate)
Marine pollutant:yes

IATA

UN number: 3082 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, liquid, n.o.s. (Dibutyl phthalate)

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Dibutyl phthalate	84-74-2	2007-07-01

SARA 311/312 Hazards

Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Dibutyl phthalate	84-74-2	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Dibutyl phthalate	84-74-2	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Dibutyl phthalate	84-74-2	2007-07-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.	84-74-2	2008-06-17
Dibutyl phthalate		

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
H360	May damage fertility or the unborn child.
H400	Very toxic to aquatic life.
Repr.	Reproductive toxicity

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	1
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	1
Reactivity Hazard:	0

Further information

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Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.11 Revision Date: 03/03/2015 Print Date: 05/01/2016

SAFETY DATA SHEET

Halocarbon R-12 (Dichlorodifluoromethane)

Section 1. Identification

GHS product identifier : Halocarbon R-12 (Dichlorodifluoromethane)

Chemical name : dichlorodifluoromethane

Other means of identification : ASPEN R-12, Methane, dichlorodifluoro-; Refrigerant 12; Propellant 12; Halon 122; Genetron 12; Freon 12; Fluorocarbon 12; Difluorodichloromethane; DICHLORODIFLUOROMETHANE (FC 12); CFC-12

Product use : Synthetic/Analytical chemistry.

Synonym : ASPEN R-12, Methane, dichlorodifluoro-; Refrigerant 12; Propellant 12; Halon 122; Genetron 12; Freon 12; Fluorocarbon 12; Difluorodichloromethane; DICHLORODIFLUOROMETHANE (FC 12); CFC-12

SDS # : 001018

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Emergency telephone number (with hours of operation) : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : GASES UNDER PRESSURE - Liquefied gas
HAZARDOUS TO THE OZONE LAYER - Category 1

GHS label elements

Hazard pictograms :



Signal word : Warning

Hazard statements : Contains gas under pressure; may explode if heated.
May cause frostbite.
May displace oxygen and cause rapid suffocation.
Harms public health and the environment by destroying ozone in the upper atmosphere.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position.

Prevention : Use and store only outdoors or in a well ventilated place.

Response : Not applicable.

Storage : Protect from sunlight. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Disposal : Refer to manufacturer/supplier for information on recovery/recycling.

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Section 2. Hazards identification

Hazards not otherwise classified : Liquid can cause burns similar to frostbite.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : dichlorodifluoromethane

Other means of identification : ASPEN R-12, Methane, dichlorodifluoro-; Refrigerant 12; Propellant 12; Halon 122; Genetron 12; Freon 12; Fluorocarbon 12; Difluorodichloromethane; DICHLORODIFLUOROMETHANE (FC 12); CFC-12

CAS number/other identifiers

CAS number : 75-71-8

Product code : 001018

Ingredient name	%	CAS number
Methane, dichlorodifluoro-	100	75-71-8

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. In case of contact with liquid, warm frozen tissues slowly with lukewarm water and get medical attention. Do not rub affected area. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if adverse health effects persist or are severe. Ingestion of liquid can cause burns similar to frostbite. If frostbite occurs, get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. As this product rapidly becomes a gas when released, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Liquid can cause burns similar to frostbite.

Inhalation : Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

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Section 4. First aid measures

Skin contact : Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : Ingestion of liquid can cause burns similar to frostbite.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
frostbite

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
frostbite

Ingestion : Adverse symptoms may include the following:
frostbite

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
halogenated compounds
carbonyl halides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. For incidents involving large quantities, thermally insulated undergarments and thick textile or leather gloves should be worn.

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Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). May be harmful to the environment if released in large quantities.

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Do not get in eyes or on skin or clothing. Avoid breathing gas. Avoid release to the environment. Refer to special instructions/safety data sheet. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

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Section 8. Exposure controls/personal protection

Ingredient name	Exposure limits
Methane, dichlorodifluoro-	**ACGIH TLV (United States, 3/2012).** TWA: 4950 mg/m³ 8 hours. TWA: 1000 ppm 8 hours. **NIOSH REL (United States, 1/2013).** TWA: 4950 mg/m³ 10 hours. TWA: 1000 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 4950 mg/m³ 8 hours. TWA: 1000 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 4950 mg/m³ 8 hours. TWA: 1000 ppm 8 hours.

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. If contact with the liquid is possible, insulated gloves suitable for low temperatures should be worn. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

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Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [Liquefied gas]

Color : Colorless.

Molecular weight : 120.91 g/mole

Molecular formula : C-Cl2-F2

Boiling/condensation point : -29.8°C (-21.6°F)

Melting/freezing point : -158°C (-252.4°F)

Critical temperature : 111.85°C (233.3°F)

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Flash point : [Product does not sustain combustion.]

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : 84.9 (psia)

Vapor density : 4.2 (Air = 1)

Specific Volume (ft^3/lb) : 3.1746

Gas Density (lb/ft^3) : 0.315

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 0.3 g/l

Partition coefficient: n-octanol/water : 2.16

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

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Section 10. Stability and reactivity

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Liquid can cause burns similar to frostbite.

Inhalation : Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.

Ingestion : Ingestion of liquid can cause burns similar to frostbite.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
frostbite

Inhalation : No specific data.

Skin contact : Adverse symptoms may include the following:
frostbite

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Section 11. Toxicological information

Ingestion : Adverse symptoms may include the following:
frostbite

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Methane, dichlorodifluoro-	2.16	6.17	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

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Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Dichlorodifluoromethane; Methane, dichlorodifluoro-	75-71-8	Listed	U075

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1028	UN1028	UN1028	UN1028	UN1028
UN proper shipping name	DICHLORODIFLUOROMETHANE OR REFRIGERANT GAS R 12	DICHLORODIFLUOROMETHANE; OR REFRIGERANT GAS R 12	DICHLORODIFLUOROMETHANE OR REFRIGERANT GAS R 12	DICHLORODIFLUOROMETHANE (REFRIGERANT GAS R 12)	DICHLORODIFLUOROMETHANE
Transport hazard class(es)	2.2 	2.2 	2.2 	2.2 	2.2 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	**Reportable quantity** 5000 lbs / 2270 kg Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. **Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: 75 kg **Cargo aircraft** Quantity limitation: 150 kg **Special provisions** T50	**Explosive Limit and Limited Quantity Index** 0.125 **Passenger Carrying Road or Rail Index** 75	-	-	**Passenger and Cargo Aircraft** Quantity limitation: 75 kg **Cargo Aircraft Only** Quantity limitation: 150 kg

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

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Section 14. Transport information

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

TSCA 12(b) annual export notification: dichlorodifluoromethane

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Sudden release of pressure

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Methane, dichlorodifluoro-	100	No.	Yes.	No.	No.	No.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	dichlorodifluoromethane	75-71-8	100
Supplier notification	dichlorodifluoromethane	75-71-8	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : This material is listed.

New York : This material is listed.

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Section 15. Regulatory information

New Jersey : This material is listed.

Pennsylvania : This material is listed.

Canada inventory : This material is listed or exempted.

International regulations

International lists : **Australia inventory (AICS)**: This material is listed or exempted.
China inventory (IECSC): This material is listed or exempted.
Japan inventory: This material is listed or exempted.
Korea inventory: This material is listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): This material is listed or exempted.
Philippines inventory (PICCS): This material is listed or exempted.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

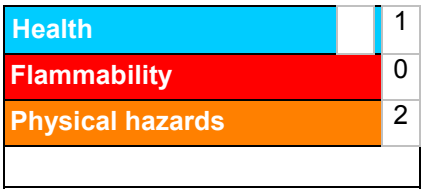
Canada

WHMIS (Canada) : Class A: Compressed gas.
CEPA Toxic substances: This material is listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class A: Compressed gas.

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



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Section 16. Other information

Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of printing : 5/21/2015.

Date of issue/Date of revision : 5/21/2015.

Date of previous issue : 5/21/2015.

Version : 2

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United NationsACGIH – American Conference of Governmental Industrial Hygienists
AIHA – American Industrial Hygiene Association
CAS – Chemical Abstract Services
CEPA – Canadian Environmental Protection Act
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)
CFR – United States Code of Federal Regulations
CPR – Controlled Products Regulations
DSL – Domestic Substances List
GWP – Global Warming Potential
IARC – International Agency for Research on Cancer
ICAO – International Civil Aviation Organisation
Inh – Inhalation
LC – Lethal concentration
LD – Lethal dosage
NDSL – Non-Domestic Substances List
NIOSH – National Institute for Occupational Safety and Health
TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

References : Not available.

Indicates information that has changed from previously issued version.

Other special considerations : WARNING: Contains (Dichlorodifluoromethane), a substance which harms the public health and environment by destroying ozone in the upper atmosphere.

Notice to reader

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Section 16. Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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SAFETY DATA SHEET

Version 5.5
Revision Date 02/28/2015
Print Date 02/09/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Dieldrin

Product Number : 291218
Brand : Aldrich
Index-No. : 602-049-00-9

CAS-No. : 60-57-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 2), H300
Acute toxicity, Dermal (Category 3), H311
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Oral (Category 1), H372
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H300 Fatal if swallowed.
H311 Toxic in contact with skin.
H351 Suspected of causing cancer.
H372 Causes damage to organs through prolonged or repeated exposure if swallowed.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.

P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P281	Use personal protective equipment as required.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician. Rinse mouth.
P302 + P352 + P312	IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or doctor/ physician if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P361	Remove/Take off immediately all contaminated clothing.
P363	Wash contaminated clothing before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : 1,2,3,4,10,10-Hexachloro-1,4,4a,5,6,7,8,8a-octahydro-6,7-epoxy-1,4:5,8-dimethanonaphthalene

Formula : $C_{12}H_8Cl_6O$

Molecular weight : 380.91 g/mol

CAS-No. : 60-57-1

EC-No. : 200-484-5

Index-No. : 602-049-00-9

Hazardous components

Component	Classification	Concentration
Dieldrin		
	Acute Tox. 2; Acute Tox. 3; Carc. 2; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H300, H311, H351, H372, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Dieldrin	60-57-1	TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Liver damage Reproductive effects Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		

		TWA	0.250000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A Potential for dermal absorption		
		TWA	0.250000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available

d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 143 - 144 °C (289 - 291 °F)
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Mouse - 38.0 mg/kg

LD50 Oral - Dog - 65.0 mg/kg

LD50 Oral - Monkey - 3.0 mg/kg

LD50 Oral - Rabbit - 45.0 mg/kg

LD50 Oral - Pig - 38.0 mg/kg

LD50 Oral - Guinea pig - 49.0 mg/kg

LD50 Oral - Hamster - 60.0 mg/kg

LD50 Oral - Pigeon - 23.7 mg/kg

LD50 Oral - Chicken - 20.0 mg/kg
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Miosis (pupilliary constriction). Behavioral:Excitement. Behavioral:Food intake (animal).

LD50 Oral - Quail - 10.8 mg/kg
Remarks: Behavioral:Altered sleep time (including change in righting reflex). Behavioral:Somnolence (general depressed activity). Behavioral:Irritability.

LD50 Oral - Duck - 381.0 mg/kg

LD50 Oral - Mammal - 94.0 mg/kg
Remarks: Peripheral Nerve and Sensation:Flaccid paralysis without anesthesia (usually neuromuscular blockage). Behavioral:Tremor. Behavioral:Convulsions or effect on seizure threshold.

LD50 Oral - Bird (wild) - 13.3 mg/kg

LDLO Oral - Rat - 30.0 mg/kg
Remarks: Liver:Other changes.

LDLO Oral - Human - male - 65.0 mg/kg

LDLO Oral - Cat - 500 mg/kg
Remarks: Lungs, Thorax, or Respiration:Chronic pulmonary edema. Liver:Fatty liver degeneration. Kidney, Ureter, Bladder:Other changes.

TDLo Oral - Rat - 140 mg/kg
Remarks: Liver:Other changes. Blood:Other changes. Biochemical:Enzyme inhibition, induction, or change in blood or tissue levels: Other esterases.

TDLo Oral - Rat - 109 mg/kg
Remarks: Liver:Changes in liver weight.

TDLo Oral - Rat - 88 mg/kg
Remarks: Behavioral:Food intake (animal). Nutritional and Gross Metabolic:Weight loss or decreased weight gain. Biochemical:Enzyme inhibition, induction, or change in blood or tissue levels: Phosphatases.

Inhalation: No data available

LD50 Dermal - Rabbit - 250.0 mg/kg

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Dieldrin)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Ingestion - Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: IO1750000

Discomfort, Headache, Nausea, Vomiting, Dizziness, Tremors, tonic convulsions, clonic spasms, Coma., respiratory failure, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Blood - Irregularities - Based on Human Evidence
Blood - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality LC50 - Carassius auratus (goldfish) - 1.6 µg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 79.5 µg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2811 Class: 6.1 Packing group: I
Proper shipping name: Toxic solids, organic, n.o.s. (Dieldrin)
Reportable Quantity (RQ): 1 lbs
Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG
UN number: 2811 Class: 6.1 Packing group: I EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (Dieldrin)
Marine pollutant:yes

IATA
UN number: 2811 Class: 6.1 Packing group: I
Proper shipping name: Toxic solid, organic, n.o.s. (Dieldrin)
IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Dieldrin	60-57-1	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Dieldrin	60-57-1	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Dieldrin	60-57-1	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Dieldrin	CAS-No. 60-57-1	Revision Date 2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H300	Fatal if swallowed.
H311	Toxic in contact with skin.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if swallowed.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	4
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.5 Revision Date: 02/28/2015 Print Date: 02/09/2016

SAFETY DATA SHEET

1. Identification

Product identifier **DIESEL FUELS**

Other means of identification

SDS number 102-GHS

Synonyms Diesel Fuels All Grades, Diesel Fuel No.2, Fuel Oil No.2, High Sulfur Diesel Fuel, Low Sulfur Diesel Fuel, Ultra Low Sulfur Diesel Fuel, CARB (California Air Resource Board) Diesel Fuel, Off-Road Diesel Fuel, Dyed Diesel Fuel, X Grade Diesel Fuel, X-1 Diesel Fuel, R5 ULSD, B5 ULS D See section 16 for complete information.

Recommended use Motor Fuel
Refinery feedstock.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer/Supplier Valero Marketing & Supply Company and Affiliates
One Valero Way
San Antonio, TX 78269-6000

General Assistance 210-345-4593

E-Mail CorpHSE@valero.com

Contact Person Industrial Hygienist

Emergency Telephone 24 Hour Emergency 866-565-5220
1-800-424-9300 (CHEMTREC USA)

2. Hazard(s) identification

Physical hazards	Flammable liquids	Category 3
Health hazards	Acute toxicity, inhalation	Category 4
	Skin corrosion/irritation	Category 2
	Carcinogenicity	Category 2
	Reproductive toxicity	Category 2
	Specific target organ toxicity, repeated exposure	Category 2
	Aspiration hazard	Category 1
Environmental hazards	Hazardous to the aquatic environment, long-term hazard	Category 2

OSHA defined hazards Not classified.

Label elements



Signal word Danger

Hazard statement Flammable liquid and vapor. Harmful if inhaled. Causes skin irritation. Suspected of causing cancer. Suspected of damaging fertility or the unborn child. May cause damage to organs (blood, thymus, liver) through prolonged or repeated exposure. May be fatal if swallowed and enters airways.

Precautionary statement

Prevention Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharges. Do not breathe mist/vapors/spray. Wash thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection. Use only outdoors or in a well-ventilated area.

Response	If skin irritation occurs: Get medical advice/attention. If inhaled: Remove person to fresh air and keep comfortable for breathing. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If exposed or concerned: Get medical advice/attention. If swallowed: Immediately call a poison center/doctor. Take off contaminated clothing and wash before reuse. In case of fire: Use foam, carbon dioxide, dry powder or water fog for extinction.
Storage	Store locked up. Store in a well-ventilated place. Keep cool.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Fuels, diesel, no. 2	68476-34-6	85 - 100
Biodiesel - Fatty acid methyl esters	67762-38-3	0 - 10
Fuels, diesel, C9-18-alkane branched and linear	1159170-26-9	0 - 5
n-Nonane	111-84-2	1 - 3
Octane (All isomers)	111-65-9	1 - 2
Hexane (Other isomers)	96-14-0	0 - 1
Naphthalene	91-20-3	0 - 1
n-Heptane	142-82-5	0 - 1
n-Hexane	110-54-3	0 - 1

4. First-aid measures

Inhalation	Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.
Skin contact	Remove contaminated clothing and shoes. Wash off immediately with soap and plenty of water. Get medical attention if irritation develops or persists. Wash clothing separately before reuse. Destroy or thoroughly clean contaminated shoes. If high pressure injection under the skin occurs, always seek medical attention.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention.
Ingestion	Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center. Do not give mouth-to-mouth resuscitation. If vomiting occurs, keep head low so that stomach content does not get into the lungs. Never give anything by mouth to a victim who is unconscious or is having convulsions. Get medical attention immediately.
Most important symptoms/effects, acute and delayed	Irritation of nose and throat. Irritation of eyes and mucous membranes. Skin irritation. Unconsciousness. Corneal damage. Narcosis. Decrease in motor functions. Behavioral changes. Edema. Liver enlargement. Jaundice. Conjunctivitis. Proteinuria. Defatting of the skin. Rash. The toxicological properties of this product have not been thoroughly investigated. Use appropriate precautions. Hydrogen sulfide, a highly toxic gas, may be present. Signs and symptoms of overexposure to hydrogen sulfide include respiratory and eye irritation, dizziness, nausea, coughing, a sensation of dryness and pain in the nose, and loss of consciousness. Odor does not provide a reliable indicator of the presence of hazardous levels in the atmosphere.
Indication of immediate medical attention and special treatment needed	In case of shortness of breath, give oxygen. Keep victim warm. Keep victim under observation. Symptoms may be delayed. The toxicological properties of this material have not been fully investigated.
General information	If exposed or concerned: get medical attention/advice. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before re-use.

5. Fire-fighting measures

Suitable extinguishing media	Water spray. Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).

Unsuitable extinguishing media	Do not use a solid water stream as it may scatter and spread fire.
Specific hazards arising from the chemical	The product is flammable, and heating may generate vapors which may form explosive vapor/air mixtures. Thermal decomposition or combustion may liberate toxic gases or fumes.
Special protective equipment and precautions for firefighters	Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask.
Fire-fighting equipment/instructions	Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask. Withdraw immediately in case of rising sound from venting safety devices or any discoloration of tanks due to fire. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Move containers from fire area if you can do it without risk. In the event of fire, cool tanks with water spray. Cool containers exposed to flames with water until well after the fire is out. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Water runoff can cause environmental damage. Use compatible foam to minimize vapor generation as needed.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Local authorities should be advised if significant spills cannot be contained. Keep upwind. Keep out of low areas. Ventilate closed spaces before entering. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. See Section 8 of the SDS for Personal Protective Equipment.
Methods and materials for containment and cleaning up	Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Local authorities should be advised if significant spillages cannot be contained. Stop leak if you can do so without risk. This material is a water pollutant and should be prevented from contaminating soil or from entering sewage and drainage systems and bodies of water. Dike the spilled material, where this is possible. Prevent entry into waterways, sewers, basements or confined areas. Use non-sparking tools and explosion-proof equipment. Small Spills: Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. This material and its container must be disposed of as hazardous waste. Large Spills: Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Prevent product from entering drains. Do not allow material to contaminate ground water system. Should not be released into the environment. Clean up in accordance with all applicable regulations.
Environmental precautions	If facility or operation has an "oil or hazardous substance contingency plan", activate its procedures. Stay upwind and away from spill. Wear appropriate protective equipment including respiratory protection as conditions warrant. Do not enter or stay in area unless monitoring indicates that it is safe to do so. Isolate hazard area and restrict entry to emergency crew. Flammable. Review Firefighting Measures, Section 5, before proceeding with clean up. Keep all sources of ignition (flames, smoking, flares, etc.) and hot surfaces away from release. Contain spill in smallest possible area. Recover as much product as possible (e.g. by vacuuming). Stop leak if it can be done without risk. Use water spray to disperse vapors. Use compatible foam to minimize vapor generation as needed. Spilled material may be absorbed by an appropriate absorbent, and then handled in accordance with environmental regulations. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment or drainage systems and natural waterways. Contact fire authorities and appropriate federal, state and local agencies. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, contact the National Response Center at 1-800-424-8802. For highway or railways spills, contact Chemtrec at 1-800-424-9300.

7. Handling and storage

Precautions for safe handling	Eliminate sources of ignition. Avoid spark promoters. Ground/bond container and equipment. These alone may be insufficient to remove static electricity. Wear personal protective equipment. Avoid breathing mist/vapors/spray. Avoid contact with eyes, skin, and clothing. Do not taste or swallow. Avoid prolonged exposure. Use only with adequate ventilation. Wash thoroughly after handling. The product is combustible, and heating may generate vapors which may form explosive vapor/air mixtures. DO NOT handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Use non-sparking tools and explosion-proof equipment. When using, do not eat, drink or smoke. Avoid release to the environment.

Conditions for safe storage, including any incompatibilities	Flammable liquid storage. Do not handle or store near an open flame, heat or other sources of ignition. This material can accumulate static charge which may cause spark and become an ignition source. The pressure in sealed containers can increase under the influence of heat. Keep container tightly closed in a cool, well-ventilated place. Keep away from food, drink and animal feedingstuffs. Keep out of the reach of children.

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Naphthalene (CAS 91-20-3)	PEL	50 mg/m3
		10 ppm
n-Heptane (CAS 142-82-5)	PEL	2000 mg/m3
		500 ppm
n-Hexane (CAS 110-54-3)	PEL	1800 mg/m3
		500 ppm
Octane (All isomers) (CAS 111-65-9)	PEL	2350 mg/m3
		500 ppm

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Fuels, diesel, no. 2 (CAS 68476-34-6)	TWA	100 mg/m3	Inhalable fraction and vapor.
Hexane (Other isomers) (CAS 96-14-0)	STEL	1000 ppm	
	TWA	500 ppm	
Naphthalene (CAS 91-20-3)	STEL	15 ppm	
	TWA	10 ppm	
n-Heptane (CAS 142-82-5)	STEL	500 ppm	
	TWA	400 ppm	
n-Hexane (CAS 110-54-3)	TWA	50 ppm	
n-Nonane (CAS 111-84-2)	TWA	200 ppm	
Octane (All isomers) (CAS 111-65-9)	TWA	300 ppm	

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Hexane (Other isomers) (CAS 96-14-0)	Ceiling	1800 mg/m3
		510 ppm
	TWA	350 mg/m3
		100 ppm
Naphthalene (CAS 91-20-3)	STEL	75 mg/m3
		15 ppm
	TWA	50 mg/m3
		10 ppm
n-Heptane (CAS 142-82-5)	Ceiling	1800 mg/m3
		440 ppm
	TWA	350 mg/m3
		85 ppm
n-Hexane (CAS 110-54-3)	TWA	180 mg/m3
		50 ppm
n-Nonane (CAS 111-84-2)	TWA	1050 mg/m3
		200 ppm
Octane (All isomers) (CAS 111-65-9)	Ceiling	1800 mg/m3
		385 ppm
	TWA	350 mg/m3
		75 ppm

Biological limit values

ACGIH Biological Exposure Indices

Components	Value	Determinant	Specimen	Sampling Time
n-Hexane (CAS 110-54-3)	0.4 mg/l	2,5-Hexanedion, without hydrolysis	Urine	*
	0.4 mg/l	2,5-Hexanedi - on, without hydrolysis		*

* - For sampling details, please see the source document.

Exposure guidelines

US - California OELs: Skin designation

n-Hexane (CAS 110-54-3) Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

Fuels, diesel, no. 2 (CAS 68476-34-6) Can be absorbed through the skin.
Naphthalene (CAS 91-20-3) Can be absorbed through the skin.
n-Hexane (CAS 110-54-3) Can be absorbed through the skin.

Appropriate engineering controls Provide adequate general and local exhaust ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Use explosion-proof equipment.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses. If splash potential exists, wear full face shield or chemical goggles.

Skin protection

Hand protection Wear chemical-resistant, impervious gloves. Suitable gloves can be recommended by the glove supplier. Be aware that the liquid may penetrate the gloves. Frequent change is advisable.

Other Full body suit and boots are recommended when handling large volumes or in emergency situations. Flame retardant protective clothing is recommended.

Respiratory protection Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. If workplace exposure limits for product or components are exceeded, NIOSH approved equipment should be worn. Proper respirator selection should be determined by adequately trained personnel, based on the contaminants, the degree of potential exposure and published respiratory protection factors. This equipment should be available for nonroutine and emergency use.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Consult supervisor for special handling instructions. Avoid contact with eyes. Avoid contact with skin. Keep away from food and drink. Wash hands before breaks and immediately after handling the product. Provide eyewash station and safety shower. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance Liquid (may be dyed red).

Physical state Liquid.

Form Liquid.

Color Clear. Straw.

Odor Kerosene (strong).

Odor threshold Not available.

pH Not available.

Melting point/freezing point -60.07 °F (-51.15 °C) Estimated

Initial boiling point and boiling range 325 - 700 °F (162.78 - 371.11 °C)

Flash point > 100.0 °F (> 37.8 °C) Closed Cup

Evaporation rate 0.02

Flammability (solid, gas) Not available.

Upper/lower flammability or explosive limits

Flammability limit - lower (%)	0.4 %
Flammability limit - upper (%)	8 %
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	< 1 mm Hg (20°C)
Vapor density	3 (Air = 1)
Relative density	0.82 - 0.87
Relative density temperature	60 °F (15.56 °C)
Solubility(ies)	
Solubility (water)	Not available.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	494.96 °F (257.2 °C)
Decomposition temperature	Not available.
Viscosity	2 - 4.5 mm²/s

10. Stability and reactivity

Reactivity	Stable at normal conditions.
Chemical stability	Stable under normal temperature conditions and recommended use.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Heat, flames and sparks. Ignition sources. Contact with incompatible materials. Do not pressurize, cut, weld, braze, solder, drill, grind or expose empty containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Ingestion	May be fatal if swallowed and enters airways.
Inhalation	Harmful if inhaled. In high concentrations, vapors and spray mists are narcotic and may cause headache, fatigue, dizziness and nausea.
Skin contact	Causes skin irritation.
Eye contact	May cause eye irritation.
Symptoms related to the physical, chemical and toxicological characteristics	Irritation of nose and throat. Irritation of eyes and mucous membranes. Skin irritation. Unconsciousness. Corneal damage. Narcosis. Decrease in motor functions. Behavioral changes. Edema. Liver enlargement. Jaundice. Conjunctivitis. Proteinuria. Defatting of the skin. Rash. The toxicological properties of this product have not been thoroughly investigated. Use appropriate precautions.

Information on toxicological effects

Acute toxicity	Harmful if inhaled. Harmful: may cause lung damage if swallowed. The toxicological properties of this material have not been fully investigated.

Components	**Species**	**Test Results**
Fuels, diesel, no. 2 (CAS 68476-34-6)		
Acute		
Inhalation		
LC50	Rat	4.1 mg/l, 4 hours

Components	Species	Test Results
Naphthalene (CAS 91-20-3)		
Acute		
Dermal		
LD50	Rabbit	> 2 g/kg
Oral		
LD50	Rat	490 mg/kg
n-Heptane (CAS 142-82-5)		
Acute		
Inhalation		
LC50	Rat	103 mg/l, 4 Hours
n-Hexane (CAS 110-54-3)		
Acute		
Oral		
LD50	Rat	28710 mg/kg
n-Nonane (CAS 111-84-2)		
Acute		
Inhalation		
LC50	Rat	3200 mg/l, 4 Hours
Octane (All isomers) (CAS 111-65-9)		
Acute		
Inhalation		
LC50	Rat	118 mg/l, 4 Hours

Skin corrosion/irritation Causes skin irritation.

Serious eye damage/eye irritation Based on available data, the classification criteria are not met.

Respiratory or skin sensitization

Respiratory sensitization Based on available data, the classification criteria are not met.

Skin sensitization Based on available data, the classification criteria are not met.

Germ cell mutagenicity Based on available data, the classification criteria are not met.

Carcinogenicity Suspected of causing cancer.
International Agency for Research on Cancer (IARC): Whole diesel engine exhaust – IARC Group 1. Exposure may cause lung cancer and also noted a positive association with an increased risk of bladder cancer.
Diesel exhaust has been reported to be an occupational hazard due to NIOSH-reported potential carcinogenic properties.

IARC Monographs. Overall Evaluation of Carcinogenicity

Fuels, diesel, no. 2 (CAS 68476-34-6)	3 Not classifiable as to carcinogenicity to humans.
Naphthalene (CAS 91-20-3)	2B Possibly carcinogenic to humans.

NTP Report on Carcinogens

Naphthalene (CAS 91-20-3)	Reasonably Anticipated to be a Human Carcinogen.

Reproductive toxicity Suspected of damaging fertility or the unborn child.
Napthalene interferes with embryo development in experimental animals at dose levels that cause maternal toxicity. In humans, excessive exposure to this agent may cause hemolytic anemia in the mother and fetus.

Specific target organ toxicity - single exposure Based on available data, the classification criteria are not met.

Specific target organ toxicity - repeated exposure May cause damage to the following organs through prolonged or repeated exposure: Blood. Liver. Thymus.

Aspiration hazard May be fatal if swallowed and enters airways.

Chronic effects Contains organic solvents which in case of overexposure may depress the central nervous system causing dizziness and intoxication. Repeated exposure to naphthalene may cause cataracts, allergic skin rashes, destruction of red blood cells, and anemia, jaundice, kidney and liver damage. Danger of serious damage to health by prolonged exposure. Prolonged or repeated overexposure may cause central nervous system, kidney, liver, and lung damage.

Further information Symptoms may be delayed. Hydrogen sulfide, a highly toxic gas, may be present. Signs and symptoms of overexposure to hydrogen sulfide include respiratory and eye irritation, dizziness, nausea, coughing, a sensation of dryness and pain in the nose, and loss of consciousness. Odor does not provide a reliable indicator of the presence of hazardous levels in the atmosphere. Toxicological properties of this material have not been fully investigated.

12. Ecological information

Ecotoxicity Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Components		Species	Test Results
Fuels, diesel, no. 2 (CAS 68476-34-6)			
Aquatic			
Acute			
Crustacea	EL50	Daphnia magna	68 mg/l, 48 hours
Fish	LL50	Oncorhynchus mykiss	65 mg/l, 96 hours
Naphthalene (CAS 91-20-3)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	1.09 - 3.4 mg/l, 48 hours
Fish	LC50	Pink salmon (Oncorhynchus gorbuscha)	0.95 - 1.62 mg/l, 96 hours
n-Heptane (CAS 142-82-5)			
Aquatic			
Fish	LC50	Western mosquitofish (Gambusia affinis)	4924 mg/l, 96 hours
n-Hexane (CAS 110-54-3)			
Aquatic			
Fish	LC50	Fathead minnow (Pimephales promelas)	2.101 - 2.981 mg/l, 96 hours

Persistence and degradability Not available.

Bioaccumulative potential Not available.

Partition coefficient n-octanol / water (log Kow)

Hexane (Other isomers) (CAS 96-14-0)	3.6
Octane (All isomers) (CAS 111-65-9)	5.18
n-Heptane (CAS 142-82-5)	4.66
n-Hexane (CAS 110-54-3)	3.9
n-Nonane (CAS 111-84-2)	5.46

Mobility in soil Not available.

Other adverse effects Not available.

13. Disposal considerations

Disposal instructions Dispose in accordance with all applicable regulations. This material and its container must be disposed of as hazardous waste. Dispose of this material and its container to hazardous or special waste collection point. Incinerate the material under controlled conditions in an approved incinerator. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container.

Hazardous waste code D001: Waste Flammable material with a flash point <140 °F

US RCRA Hazardous Waste U List: Reference

Naphthalene (CAS 91-20-3)	U165

Waste from residues / unused products Dispose of in accordance with local regulations.

Contaminated packaging Offer rinsed packaging material to local recycling facilities.

14. Transport information

DOT

UN number UN1202

UN proper shipping name Diesel fuel

Transport hazard class(es)

Class Combustible Liquid

Subsidiary risk -

Packing group III

Environmental hazards

Marine pollutant	Yes
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Special provisions	144, B1, IB3, T2, TP1
Packaging exceptions	150
Packaging non bulk	203
Packaging bulk	242

IATA

UN number	UN1202
UN proper shipping name	Diesel fuel
Transport hazard class(es)	
Class	3
Subsidiary risk	-
Label(s)	3
Packing group	III
Environmental hazards	Yes
ERG Code	3L
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number	UN1202
UN proper shipping name	DIESEL FUEL
Transport hazard class(es)	
Class	3
Subsidiary risk	-
Label(s)	3
Packing group	III
Environmental hazards	
Marine pollutant	Yes
EmS	F-E, S-E
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not applicable. However, this product is a liquid and if transported in bulk covered under MARPOL 73/78, Annex I.

15. Regulatory information

US federal regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

n-Nonane (CAS 111-84-2)	1.0 % One-Time Export Notification only.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Hexane (Other isomers) (CAS 96-14-0)	LISTED
Naphthalene (CAS 91-20-3)	LISTED
n-Heptane (CAS 142-82-5)	LISTED
n-Hexane (CAS 110-54-3)	LISTED
n-Nonane (CAS 111-84-2)	LISTED
Octane (All isomers) (CAS 111-65-9)	LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - No Delayed Hazard - No Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical	Yes

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Naphthalene	91-20-3	0 - 1

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Naphthalene (CAS 91-20-3)
n-Hexane (CAS 110-54-3)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

US. Massachusetts RTK - Substance List

Hexane (Other isomers) (CAS 96-14-0)
Naphthalene (CAS 91-20-3)
n-Heptane (CAS 142-82-5)
n-Hexane (CAS 110-54-3)
n-Nonane (CAS 111-84-2)
Octane (All isomers) (CAS 111-65-9)

US. New Jersey Worker and Community Right-to-Know Act

Fuels, diesel, no. 2 (CAS 68476-34-6)
Naphthalene (CAS 91-20-3)
n-Heptane (CAS 142-82-5)
n-Hexane (CAS 110-54-3)
n-Nonane (CAS 111-84-2)
Octane (All isomers) (CAS 111-65-9)

US. Pennsylvania Worker and Community Right-to-Know Law

Fuels, diesel, no. 2 (CAS 68476-34-6)
Hexane (Other isomers) (CAS 96-14-0)
Naphthalene (CAS 91-20-3)
n-Heptane (CAS 142-82-5)
n-Hexane (CAS 110-54-3)
n-Nonane (CAS 111-84-2)
Octane (All isomers) (CAS 111-65-9)

US. Rhode Island RTK

Naphthalene (CAS 91-20-3)
n-Hexane (CAS 110-54-3)

US. California Proposition 65

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Benzene (CAS 71-43-2)
Toluene (CAS 108-88-3)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	No
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	No
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	No

Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

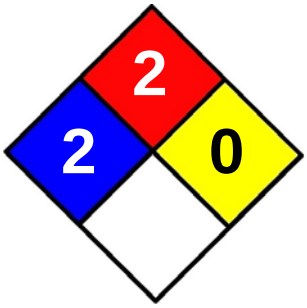
Issue date 13-May-2013

Revision date 23-May-2014

Version # 04

Further information HMIS® is a registered trade and service mark of the NPCA.

NFPA Ratings



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SAFETY DATA SHEET

Version 6.6
Revision Date 09/08/2024
Print Date 09/09/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Di-n-octyl phthalate

Product Number : 80153
Brand : Aldrich
CAS-No. : 117-84-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Long-term (chronic) aquatic hazard (Category 4), H413

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

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operates as MilliporeSigma in the US and Canada

Pictogram	none
Signal Word	none
Hazard Statements	
H413	May cause long lasting harmful effects to aquatic life.
Precautionary Statements	
P273	Avoid release to the environment.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Phthalic acid di-n-octyl ester

Molecular weight : 390.56 g/mol
CAS-No. : 117-84-0
EC-No. : 204-214-7

Component	Classification	Concentration
Dioctyl phthalate		
	Aquatic Chronic 4; H413	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

If inhaled
After inhalation: fresh air.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most). Consult doctor if feeling unwell.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

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SECTION 5: Firefighting measures

5.1 Extinguishing media

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air on intense heating.

5.3 Advice for firefighters

In the event of fire, wear self-contained breathing apparatus.

5.4 Further information

Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed.

Storage class
Storage class (TRGS 510): 10: Combustible liquids

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7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.
Hazardous components without workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Change contaminated clothing. Wash hands after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm
Break through time: 480 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 230 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Respiratory protection
Not required; except in case of aerosol formation.

Control of environmental exposure
Do not let product enter drains.

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SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear, viscous Color: colorless
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	-25 °C (-13 °F)
f)	Initial boiling point and boiling range	220 °C 428 °F
g)	Flash point	109.0 °C (228.2 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	0.98 g/mL at 20 °C (68 °F)
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

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SECTION 10: Stability and reactivity

10.1 Reactivity
Forms explosive mixtures with air on intense heating.
A range from approx. 15 Kelvin below the flash point is to be rated as critical.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Strong heating.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 47,000 mg/kg
Remarks: (RTECS)
Inhalation: No data available
LD50 Dermal - Guinea pig - > 5,000 mg/kg
Remarks: (RTECS)

Skin corrosion/irritation
Skin - Rabbit
Result: Mild skin irritation - 24 h
Remarks: (RTECS)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation - 24 h
Remarks: (RTECS)

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is

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on OSHA's list of regulated carcinogens.

Reproductive toxicity
Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Effects on Embryo or Fetus: Other effects to embryo.
RTECS: TI1925000
embryonic development, fetal development, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	NOEC - Cyprinodon variegatus (sheepshead minnow) - 168 mg/l - 96 h Remarks: (ECOTOX Database)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Gambusia affinis (Mosquito fish) - 33 d - 0.00006 mg/l(Dioctyl phthalate) Bioconcentration factor (BCF): 9,400

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 3082 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, liquid, n.o.s. (Dioctyl phthalate)
Reportable Quantity (RQ): 5000 lbs
Poison Inhalation Hazard: No

IMDG
Not dangerous goods

IATA
Not dangerous goods

Further information
Not classified as dangerous in the meaning of transport regulations.

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Dioctyl phthalate	117-84-0	5000	5000

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : No SARA Hazards

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SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know

Dioctyl phthalate	117-84-0

Pennsylvania Right To Know

Dioctyl phthalate	117-84-0

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Dioctyl phthalate	117-84-0

Washington Chemicals of High Concern

Dioctyl phthalate	117-84-0

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.6 Revision Date: 09/08/2024 Print Date: 09/09/2024

The life science business of Merck KGaA, Darmstadt, Germany
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SAFETY DATA SHEET

Version 5.2
Revision Date 06/27/2014
Print Date 11/17/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Endosulfan II (beta)

Product Number : 48578
Brand : Supelco

CAS-No. : 33213-65-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H301 Toxic if swallowed.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P273 Avoid release to the environment.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P321 Specific treatment (see supplemental first aid instructions on this label).
P330 Rinse mouth.
P391 Collect spillage.
P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : β-Endosulfan

Formula : C9H6Cl6O3S
Molecular Weight : 406.93 g/mol
CAS-No. : 33213-65-9

Hazardous components

Component	Classification	Concentration
β-Endosulfan		
	Acute Tox. 3; Aquatic Acute 1; Aquatic Chronic 1; H301, H410	-

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Sulphur oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.Normal measures for preventive fire protection.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	no data available
c)	Odour Threshold	no data available
d)	pH	no data available
e)	Melting point/freezing point	no data available
f)	Initial boiling point and boiling range	no data available
g)	Flash point	no data available
h)	Evapouration rate	no data available
i)	Flammability (solid, gas)	no data available
j)	Upper/lower flammability or explosive limits	no data available
k)	Vapour pressure	no data available
l)	Vapour density	no data available
m)	Relative density	no data available
n)	Water solubility	no data available
o)	Partition coefficient: n-octanol/water	no data available
p)	Auto-ignition temperature	no data available
q)	Decomposition temperature	no data available
r)	Viscosity	no data available
s)	Explosive properties	no data available
t)	Oxidizing properties	no data available

9.2 Other safety information
no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - rat - 240.0 mg/kg

Inhalation: no data available

Dermal: no data available

no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: RB9875200

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Kidney -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - other fish - 0.0066 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - > 0.1 - < 1 mg/l - 48 h

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
Bioaccumulation other fish - 21 d
- 0.0001 mg/l

Bioconcentration factor (BCF): 9,908

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (β-Endosulfan)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: Marine pollutant
Poison Inhalation Hazard: No

IMDG
UN number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (β-Endosulfan)
Marine pollutant: No

IATA
UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (β-Endosulfan)

15. REGULATORY INFORMATION

SARA 302 Components

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
β-Endosulfan	33213-65-9	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
β-Endosulfan	33213-65-9	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
β-Endosulfan	33213-65-9	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H301	Toxic if swallowed.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.2 Revision Date: 06/27/2014 Print Date: 11/17/2016

SAFETY DATA SHEET

Version 5.1
Revision Date 06/27/2014
Print Date 04/20/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Endosulfan sulfate

Product Number : 36676
Brand : Sigma

CAS-No. : 1031-07-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 2), H300
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H300 Fatal if swallowed.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P273 Avoid release to the environment.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P321 Specific treatment (see supplemental first aid instructions on this label).
P330 Rinse mouth.
P391 Collect spillage.
P405 Store locked up.

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : $C_9H_6Cl_6O_4S$
Molecular Weight : 422.92 g/mol
CAS-No. : 1031-07-8

Hazardous components

Component	Classification	Concentration
Endosulfan sulfate		
	Acute Tox. 2; Aquatic Acute 1; Aquatic Chronic 1; H300, H410	-

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Sulphur oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.Normal measures for preventive fire protection.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	no data available
c)	Odour Threshold	no data available
d)	pH	no data available
e)	Melting point/freezing point	179.0 - 182.0 °C (354.2 - 359.6 °F)
f)	Initial boiling point and boiling range	no data available
g)	Flash point	no data available
h)	Evapouration rate	no data available
i)	Flammability (solid, gas)	no data available
j)	Upper/lower flammability or explosive limits	no data available
k)	Vapour pressure	no data available
l)	Vapour density	no data available
m)	Relative density	no data available
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	log Pow: 3.66
p)	Auto-ignition temperature	no data available
q)	Decomposition temperature	no data available
r)	Viscosity	no data available
s)	Explosive properties	no data available
t)	Oxidizing properties	no data available

9.2 Other safety information
no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - rat - 18.0 mg/kg

Inhalation: no data available

Dermal: no data available

no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: RB9150000

Cholinesterase inhibitors can cause heavy salivation and secretion in the lungs, lachrymation, blurred vision, involuntary defecation, diarrhea, tremor, ataxia, sweating, hypothermia, lowered heart rate, and/or a fall in blood pressure as a result of their action at cholinergic nerve sites., Headache, Nausea, Vomiting, Dizziness, Drowsiness, Confusion., Weakness, Muscle cramps/spasms., Change in pupil size., Fever, Seizures., Incoordination., Convulsions, Coma.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Carassius auratus (goldfish) - > 0.01 - < 0.1 mg/l - 48.0 h
	LC50 - Leuciscus idus (Golden orfe) - > 0.01 - < 0.1 mg/l - 48.0 h
	LC50 - other fish - > 0.001 - < 0.01 mg/l - 48.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.76 mg/l - 48 h
	LC50 - Daphnia magna (Water flea) - > 0.1 - < 1 mg/l - 48 h

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2811 Class: 6.1 Packing group: II
Proper shipping name: Toxic solids, organic, n.o.s. (Endosulfan sulfate)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 2811 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (Endosulfan sulfate)
Marine pollutant: No

IATA
UN number: 2811 Class: 6.1 Packing group: II
Proper shipping name: Toxic solid, organic, n.o.s. (Endosulfan sulfate)

15. REGULATORY INFORMATION

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Endosulfan sulfate	1031-07-8	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Endosulfan sulfate	1031-07-8	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Endosulfan sulfate	1031-07-8	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H300	Fatal if swallowed.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	3
Fire Hazard:	0
Reactivity Hazard:	0

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.1 Revision Date: 06/27/2014 Print Date: 04/20/2016

SAFETY DATA SHEET

Version 5.5
Revision Date 08/09/2016
Print Date 07/31/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name	:	Endrin
Product Number	:	49032
Brand	:	Supelco
Index-No.	:	602-051-00-X
CAS-No.	:	72-20-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	:	Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052

1.4 Emergency telephone number

Emergency Phone #	:	+1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 1), H300
Acute toxicity, Dermal (Category 2), H310
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word — Danger

Hazard statement(s)

H300 + H310	Fatal if swallowed or in contact with skin
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P262	Do not get in eyes, on skin, or on clothing.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse

	mouth.
P302 + P350 + P310	IF ON SKIN: Gently wash with plenty of soap and water. Immediately call a POISON CENTER or doctor/ physician.
P361	Remove/Take off immediately all contaminated clothing.
P363	Wash contaminated clothing before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_{12}H_8Cl_6O$
Molecular weight	:	380.91 g/mol
CAS-No.	:	72-20-8
EC-No.	:	200-775-7
Index-No.	:	602-051-00-X

Hazardous components

Component	Classification	Concentration
Endrin		
	Acute Tox. 1; Acute Tox. 2; Aquatic Acute 1; Aquatic Chronic 1; H300 + H310, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature 2 - 8 °C

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Endrin	72-20-8	TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Headache Liver damage Not classifiable as a human carcinogen Danger of cutaneous absorption		
		TWA	0.100000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		
		TWA	0.100000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		

		PEL	0.1 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available

f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	log Pow: 5.20
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	226.0 °C (438.8 °F) -
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 3.0 mg/kg

Inhalation: No data available

LD50 Dermal - Rabbit - 60.0 mg/kg

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Central nervous system -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - < 0.001 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia pulex (Water flea) - 0.02 mg/l - 48 h
	Immobilization EC50 - Daphnia magna (Water flea) - 0.0042 mg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Bioaccumulation: Pimephales promelas (fathead minnow) - 56 d - 0.63 mg/l

Bioconcentration factor (BCF): 13,000

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2811 Class: 6.1 Packing group: I
Proper shipping name: Toxic solids, organic, n.o.s. (Endrin)
Reportable Quantity (RQ): 1 lbs
Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG
UN number: 2811 Class: 6.1 Packing group: I EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (Endrin)
Marine pollutant:yes

IATA
UN number: 2811 Class: 6.1 Packing group: I
Proper shipping name: Toxic solid, organic, n.o.s. (Endrin)

15. REGULATORY INFORMATION

SARA 302 Components
The following components are subject to reporting levels established by SARA Title III, Section 302:

	CAS-No.	Revision Date
Endrin	72-20-8	2007-07-01

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Endrin	72-20-8	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Endrin	72-20-8	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Endrin	72-20-8	2007-07-01

California Prop. 65 Components
WARNING: This product contains a chemical known to the CAS-No. Revision Date

State of California to cause birth defects or other reproductive harm. Endrin	72-20-8	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H300	Fatal if swallowed.
H300 + H310	Fatal if swallowed or in contact with skin
H310	Fatal in contact with skin.

HMIS Rating

Health hazard:	4
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	3
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.5 Revision Date: 08/09/2016 Print Date: 07/31/2019

SAFETY DATA SHEET

Version 4.10
Revision Date 07/09/2015
Print Date 02/23/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name	:	Ethyl Alcohol, pure
Product Number	:	459836
Brand	:	Sigma-Aldrich
Index-No.	:	603-002-00-5
CAS-No.	:	64-17-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	:	Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052

1.4 Emergency telephone number

Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Eye irritation (Category 2A), H319

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word: Danger

Hazard statement(s)

H225	Highly flammable liquid and vapour.
H319	Causes serious eye irritation.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P264	Wash skin thoroughly after handling.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing.

	Rinse skin with water/shower.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Absolute alcohol
Formula	:	C_2H_6O
Molecular weight	:	46.07 g/mol
CAS-No.	:	64-17-5
EC-No.	:	200-578-6
Index-No.	:	603-002-00-5

Hazardous components

Component	Classification	Concentration
Ethanol		
	Flam. Liq. 2; Eye Irrit. 2A; H225, H319	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Hygroscopic.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Ethanol	64-17-5	TWA	1,000.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation Confirmed animal carcinogen with unknown relevance to humans		
		TWA	1,000 ppm 1,900 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	1,000 ppm 1,900 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	1,000.000000 ppm 1,900.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

		TWA	1,000.000000 ppm 1,900.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		STEL	1,000.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Confirmed animal carcinogen with unknown relevance to humans		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm
Break through time: 38 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
impervious clothing, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available

c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -114 °C (-173 °F)
f)	Initial boiling point and boiling range	78 °C (172 °F)
g)	Flash point	14.0 °C (57.2 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 19 %(V) Lower explosion limit: 3.3 %(V)
k)	Vapour pressure	59.5 hPa (44.6 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.789 g/mL at 25 °C (77 °F)
n)	Water solubility	completely soluble
o)	Partition coefficient: n-octanol/water	log Pow: -0.349 at 24 °C (75 °F)
p)	Auto-ignition temperature	363.0 °C (685.4 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Alkali metals, Oxidizing agents, Peroxides

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 10,470 mg/kg

LC50 Inhalation - Rat - 4 h - 30,000 mg/l

LD50 Dermal - Rabbit - 15,800 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 24 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Moderate eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

Carcinogenicity - Mouse - Oral
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Liver:Tumors. Blood:Lymphomas including Hodgkin's disease.

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

Reproductive toxicity - Human - female - Oral
Effects on Newborn: Apgar score (human only). Effects on Newborn: Other neonatal measures or effects. Effects on Newborn: Drug dependence.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: KQ6300000

Central nervous system depression, narcosis, Damage to the heart., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 14,200 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Ceriodaphnia dubia (water flea) - 5,012 mg/l - 48 h

NOEC - Daphnia magna (Water flea) - 9.6 mg/l - 9 d

Toxicity to algae — EC50 - Chlorella vulgaris (Fresh water algae) - 275 mg/l - 72 h (OECD Test Guideline 201)

12.2 Persistence and degradability

Biodegradability — Result: 95 % - Readily biodegradable

12.3 Bioaccumulative potential

Due to the distribution coefficient n-octanol/water, accumulation in organisms is not expected.

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1170 Class: 3 Packing group: II
Proper shipping name: Ethanol
Reportable Quantity (RQ):

Poison Inhalation Hazard: No

IMDG

UN number: 1170 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: ETHANOL

IATA

UN number: 1170 Class: 3 Packing group: II
Proper shipping name: Ethanol

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Ethanol	64-17-5	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date

Ethanol	64-17-5	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Ethanol	64-17-5	2007-03-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H319	Causes serious eye irritation.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.10 Revision Date: 07/09/2015 Print Date: 02/23/2016

SAFETY DATA SHEET

Version 3.12
Revision Date 02/26/2015
Print Date 04/30/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Ethyl acetate

Product Number : 154857
Brand : Sigma-Aldrich
Index-No. : 607-022-00-5

CAS-No. : 141-78-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H319 Causes serious eye irritation.
H336 May cause drowsiness or dizziness.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.

P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Repeated exposure may cause skin dryness or cracking.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_4H_8O_2$
Molecular weight	:	88.11 g/mol
CAS-No.	:	141-78-6
EC-No.	:	205-500-4
Index-No.	:	607-022-00-5
Registration number	:	01-2119475103-46-XXXX

Hazardous components

Component	Classification	Concentration
Ethyl acetate		
	Flam. Liq. 2; ; Eye Irrit. 2A; STOT SE 3; H225,, H319, H336	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Ethyl acetate	141-78-6	TWA	400.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation Eye irritation		

		TWA	400.000000 ppm 1,400.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	400.000000 ppm 1,400.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

Derived No Effect Level (DNEL)

Application Area	Exposure routes	Health effect	Value
Workers	Inhalation	Acute systemic effects	1468 mg/m3
Workers	Inhalation	Acute local effects	1468 mg/m3
Workers	Skin contact	Long-term systemic effects	63mg/kg BW/d
Workers	Inhalation	Long-term systemic effects	734 mg/m3
Workers	Inhalation	Long-term local effects	734 mg/m3
Consumers	Inhalation	Acute local effects, Acute systemic effects	734 mg/m3
Consumers	Skin contact	Long-term systemic effects	37mg/kg BW/d
Consumers	Inhalation	Long-term systemic effects	367 mg/m3
Consumers	Ingestion	Long-term systemic effects	4.5mg/kg BW/d
Consumers	Inhalation	Long-term local effects	367 mg/m3

Predicted No Effect Concentration (PNEC)

Compartment	Value
Soil	0.24 mg/kg
Marine water	0.026 mg/l
Fresh water	0.26 mg/l
Marine sediment	0.125 mg/kg
Fresh water sediment	1.25 mg/kg

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 113 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
impervious clothing, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: clear, liquid Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	-84.0 °C (-119.2 °F)
f)	Initial boiling point and boiling range	76.5 - 77.5 °C (169.7 - 171.5 °F) - lit.
g)	Flash point	-2.99 °C (26.62 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	May form explosive dust-air mixture.
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 11.5 %(V) Lower explosion limit: 2.2 %(V)
k)	Vapour pressure	97.3 hPa (73.0 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.90 g/cm3 at 20 °C (68 °F)
n)	Water solubility	soluble
o)	Partition coefficient: n-octanol/water	log Pow: 0.73
p)	Auto-ignition temperature	427.0 °C (800.6 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	24.0 mN/m at 20.0 °C (68.0 °F)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 5,620 mg/kg

LC50 Inhalation - Mouse - 2 h - 45,000 mg/m3

LD50 Dermal - Rabbit - > 18,000 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Mild skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: AH5425000

Inhalation of high concentrations may cause:, Headache, Drowsiness, Dizziness, Vomiting, narcosis, anemia, Central nervous system depression

Kidney - Irregularities - Based on Human Evidence
Kidney - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 350.00 - 600.00 mg/l - 96 h
	LC50 - Pimephales promelas (fathead minnow) - 220.00 - 250.00 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 2,300.00 - 3,090.00 mg/l - 24 h
	LC50 - Daphnia magna (Water flea) - 560 mg/l - 48 h
Toxicity to algae	EC50 - Algae - 4,300.00 mg/l - 24 h
	EC50 - SELENASTRUM - 1,800.00 - 3,200.00 mg/l - 72 h

12.2 Persistence and degradability

Biodegradability	Result: 79 % - Readily biodegradable (OECD Test Guideline 301D)

12.3 Bioaccumulative potential

Bioaccumulation	- 3 d
	Bioconcentration factor (BCF): 30

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1173 Class: 3 Packing group: II
Proper shipping name: Ethyl acetate
Reportable Quantity (RQ): 5000 lbs

Poison Inhalation Hazard: No

IMDG

UN number: 1173 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: ETHYL ACETATE

IATA

UN number: 1173 Class: 3 Packing group: II
Proper shipping name: Ethyl acetate

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Ethyl acetate	141-78-6	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Ethyl acetate	141-78-6	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Ethyl acetate	141-78-6	1993-04-24

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

	Combustible dust
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
STOT SE	Specific target organ toxicity - single exposure

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.12 Revision Date: 02/26/2015 Print Date: 04/30/2016

MATHESON
ask. . .The Gas Professionals™

Safety Data Sheet

Material Name: ETHYL BENZENE **SDS ID: MAT08780**

Section 1 - PRODUCT AND COMPANY IDENTIFICATION

Material Name
ETHYL BENZENE
Synonyms
MTG MSDS 185; EB; PHENYLETHANE; ETHYLBENZENE; ETHYLBENZOL; ALPHA-METHYLTOLUENE; UN 1175; C8H10
Chemical Family
Hydrocarbons, aromatic
Product Use
industrial.
Restrictions on Use
None known.
Details of the supplier of the safety data sheet
MATHESON TRI-GAS, INC.
150 Allen Road, Suite 302
Basking Ridge, NJ 07920
General Information: 1-800-416-2505
Emergency #: 1-800-424-9300 (CHEMTREC)
Outside the US: 703-527-3887 (Call collect)

Section 2 - HAZARDS IDENTIFICATION

Classification in accordance with paragraph (d) of 29 CFR 1910.1200.
Flammable Liquids - Category 2
Aspiration Hazard - Category 1
Acute Toxicity - Inhalation - Dust/Mist - Category 4
Acute Toxicity - Inhalation - Vapor - Category 4
Skin Corrosion/Irritation - Category 2
Serious Eye Damage/Eye Irritation - Category 2A
Carcinogenicity - Category 2
Reproductive Toxicity - Category 1B
Specific target organ toxicity - Single exposure - Category 2
Specific target organ toxicity - Single exposure - Category 3
Specific Target Organ Toxicity - Repeated Exposure - Category 2 (ears , Ears)
Hazardous to the Aquatic Environment - Acute - Category 2
Hazardous to the Aquatic Environment - Chronic - Category 2
GHS Label Elements
Symbol(s)



Signal Word
Danger
Hazard Statement(s)

Highly flammable liquid and vapor.
Harmful if inhaled.
Causes skin irritation.
Causes serious eye irritation.
Suspected of causing cancer.
May damage fertility or the unborn child.
May cause damage to organs. (central nervous system)
May cause respiratory irritation.
May be fatal if swallowed and enters airways.
Toxic to aquatic life.

Precautionary Statement(s)

Prevention

Keep away from heat, sparks, open flame, and hot surfaces - No smoking.
Keep container tightly closed.
Ground/Bond container and receiving equipment.
Use explosion-proof electrical/ventilating/lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Use Personal Protective equipment as required.
Do not breathe vapor or mist.
Use only outdoors or in a well-ventilated area.
Wear protective gloves and eye/face protection.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Avoid release to the environment.

Response

In case of fire, use media appropriate for extinction.
IF exposed or concerned: Get medical advice/attention.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Call a POISON CENTER or doctor/physician if you feel unwell.
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
If skin irritation occurs: Get medical advice/attention.
Wash contaminated clothing before reuse.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do.
Continue rinsing.
If eye irritation persists: Get medical advice/attention.
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
Do NOT induce vomiting.

Storage

Store in a well-ventilated place.
Keep cool.
Keep container tightly closed.
Store locked up.

Disposal

Dispose in accordance with all applicable regulations.

Statement(s) of Unknown Acute Toxicity

Inhalation 0% of the mixture consists of ingredient(s) of unknown acute toxicity.

Statement(s) of Unknown Aquatic Toxicity
0% of the mixture consists of ingredient(s) of unknown acute aquatic toxicity.
0% of the mixture consists of ingredient(s) of unknown chronic aquatic toxicity.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

CAS	Component Name	Percent
100-41-4	ETHYL BENZENE	100

Section 4 - FIRST AID MEASURES

Inhalation
If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.
Skin
Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.
Eyes
Flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Then get immediate medical attention.
Ingestion
aspiration hazard. Do NOT induce vomiting. When vomiting occurs, keep head lower than hips to help prevent aspiration. Get medical attention immediately. Give artificial respiration if not breathing.
Most Important Symptoms/Effects
Acute
respiratory tract irritation, skin irritation, eye irritation, central nervous system damage, lung damage (from aspiration)
Delayed
cancer, Reproductive Effects
Note to Physicians
For inhalation, consider oxygen.

Section 5 - FIRE FIGHTING MEASURES

Extinguishing Media
Suitable Extinguishing Media
regular dry chemical, carbon dioxide, water spray, regular foam, Large fires: Use water spray, fog or regular foam.
Unsuitable Extinguishing Media
Do not use high-pressure water streams.
Special Hazards Arising from the Chemical
Severe fire hazard. Vapor/air mixtures are explosive above flash point. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.
Hazardous Combustion Products
Oxides of carbon
Fire Fighting Measures
Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank,

rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Do not attempt to extinguish fire unless flow of material can be stopped first. Flood with fine water spray. Do not scatter spilled material with high-pressure water streams. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Water may be ineffective.

Special Protective Equipment and Precautions for Firefighters

Wear full protective fire fighting gear including self contained breathing apparatus (SCBA) for protection against possible exposure.

Section 6 - ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

Wear personal protective clothing and equipment, see Section 8.

Methods and Materials for Containment and Cleaning Up

Avoid heat, flames, sparks and other sources of ignition. Eliminate all ignition sources if safe to do so. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if possible without personal risk. Prevent entry into waterways, sewers, basements, or confined areas. Reduce vapors with water spray. Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Dike for later disposal. Remove sources of ignition. Use water spray to reduce vapors or divert vapor cloud drift. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

Environmental Precautions

Avoid release to the environment.

Section 7 - HANDLING AND STORAGE

Precautions for Safe Handling

Keep away from heat, sparks, open flame, and hot surfaces - No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharges. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use Personal Protective equipment as required. Do not breathe vapor or mist. Use only outdoors or in a well-ventilated area. Wear protective gloves/eye protection/face protection. Wash hands thoroughly after handling. Do not eat, drink, or smoke when using this product. Avoid release to the environment.

Conditions for Safe Storage, Including any Incompatibilities

Store in a well-ventilated place.
Keep cool.
Keep container tightly closed.
Store locked up.
Store and handle in accordance with all current regulations and standards. Store in a well-ventilated area. Keep cool. Keep container tightly closed. Keep locked up. Grounding and bonding required. Keep separated from incompatible substances. Protect from physical damage. Store outside or in a detached building. Store with flammable liquids. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106.

Incompatible Materials

Acids, bases, oxidizing materials, combustible materials

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Component Exposure Limits

ETHYL BENZENE	**100-41-4**

ACGIH:	20 ppm TWA
NIOSH:	100 ppm TWA ; 435 mg/m3 TWA
	125 ppm STEL ; 545 mg/m3 STEL
	800 ppm IDLH (10% LEL)
Europe:	100 ppm TWA ; 442 mg/m3 TWA
	Possibility of significant uptake through the skin
	200 ppm STEL ; 884 mg/m3 STEL
OSHA (US):	100 ppm TWA ; 435 mg/m3 TWA
Mexico:	100 ppm TWA VLE-PPT ; 435 mg/m3 TWA VLE-PPT
	125 ppm STEL [PPT-CT]; 545 mg/m3 STEL [PPT-CT]

ACGIH - Threshold Limit Values - Biological Exposure Indices (BEI)
ETHYL BENZENE (100-41-4)
0.15 g/g creatinine Medium: urine Time: end of shift Parameter: Sum of mandelic acid and phenylglyoxylic acid (nonspecific)

Engineering Controls
Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

Individual Protection Measures, such as Personal Protective Equipment

Eye/face protection
Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin Protection
Wear appropriate chemical resistant clothing.

Respiratory Protection
The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA. 800 ppm. Any air-purifying half-mask respirator equipped with organic vapor cartridge(s). Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister. Any powered, air-purifying respirator with organic vapor cartridge(s). Any supplied-air respirator. Any self-contained breathing apparatus with a full facepiece. Emergency or planned entry into unknown concentrations or IDLH conditions -. Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode. Escape -. Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister. Any appropriate escape-type, self-contained breathing apparatus. Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode. Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Glove Recommendations
Wear appropriate chemical resistant gloves.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Clear, colorless liquid	**Physical State**	liquid
Odor	aromatic odor	**Color**	colorless
Odor Threshold	140 ppm	**pH**	Not available
Melting Point	-95 °C (-139 °F)	**Boiling Point**	136 °C (277 °F)
Boiling Point Range	Not available	**Freezing point**	Not available
Evaporation Rate	<1 (Butyl acetate = 1)	**Flammability (solid, gas)**	Not available
Autoignition Temperature	432 °C (810 °F)	**Flash Point**	15 °C Closed Cup (59 °F)
Lower Explosive Limit	0.8 %	**Decomposition temperature**	Not available
Upper Explosive Limit	6.7 %	**Vapor Pressure**	7.1 mmHg @ 20 °C
Vapor Density (air=1)	3.66	**Specific Gravity (water=1)**	0.867
Water Solubility	0.015 %	**Partition coefficient: n-octanol/water**	154170.05
Viscosity	0.64 cp	**Kinematic viscosity**	Not available
Solubility (Other)	Not available	**Bioconcentration Factor (BCF)**	36.39
Density	Not available	**Henry's Law Constant**	0.00788 atm-m3/mole
KOC	520 (Estimated)	**Physical Form**	liquid
Volatility	100 %	**Molecular Formula**	C-H3-C-H2-C6-H5
Molecular Weight	106.17	**OSHA Flammability Class**	IB

Solvent Solubility
Soluble
alcohol, ether, Benzene, sulfur dioxide, carbon tetrachloride
Insoluble
ammonia

Section 10 - STABILITY AND REACTIVITY

Reactivity
No reactivity hazard is expected.
Chemical Stability
Stable at normal temperatures and pressure.

Possibility of Hazardous Reactions
Will not polymerize.
Conditions to Avoid
Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.
Incompatible Materials
Acids, bases, oxidizing materials, combustible materials
Hazardous decomposition products
Oxides of carbon

Section 11 - TOXICOLOGICAL INFORMATION

Information on Likely Routes of Exposure
Inhalation
irritation (possibly severe), chest pain, difficulty breathing, emotional disturbances, headache, drowsiness, dizziness, loss of coordination, coma, cancer
Skin Contact
irritation
Eye Contact
irritation
Ingestion
nausea, vomiting, stomach pain, aspiration hazard
Acute and Chronic Toxicity
Component Analysis - LD50/LC50
The components of this material have been reviewed in various sources and the following selected endpoints are published:
ETHYL BENZENE (100-41-4)
Oral LD50 Rat 3500 mg/kg
Dermal LD50 Rabbit 15400 mg/kg
Inhalation LC50 Rat 17.4 mg/L 4 h
Product Toxicity Data
Acute Toxicity Estimate

Dermal	> 2000 mg/kg
Inhalation - Vapor	17.4 mg/L
Oral	> 2000 mg/kg

Immediate Effects
respiratory tract irritation, skin irritation, eye irritation, central nervous system damage, lung damage (from aspiration)
Delayed Effects
Reproductive Effects, cancer
Irritation/Corrosivity Data
respiratory tract irritation, skin irritation, eye irritation
Respiratory Sensitization
No data available.
Dermal Sensitization
No data available.
Component Carcinogenicity

ETHYL BENZENE	**100-41-4**
ACGIH:	A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
IARC:	Monograph 77 [2000] (Group 2B (possibly carcinogenic to humans))
DFG:	Category 4 (no significant contribution to human cancer)
OSHA:	Present

Germ Cell Mutagenicity
No data available.
Tumorigenic Data
No data available
Reproductive Toxicity
Available data characterizes components of this product as reproductive hazards.
Specific Target Organ Toxicity - Single Exposure
central nervous system, Respiratory system
Specific Target Organ Toxicity - Repeated Exposure
No target organs identified.
Aspiration hazard
This material is an aspiration hazard.
Medical Conditions Aggravated by Exposure
kidney disorders, liver disorders, respiratory disorders, skin disorders and allergies
Additional Data
May cross the placenta.

Section 12 - ECOLOGICAL INFORMATION

Ecotoxicity
Toxic to aquatic life.
Component Analysis - Aquatic Toxicity

ETHYL BENZENE	**100-41-4**
Fish:	LC50 96 h Oncorhynchus mykiss 11 - 18 mg/L [static]; LC50 96 h Oncorhynchus mykiss 4.2 mg/L [semi-static]; LC50 96 h Pimephales promelas 7.55 - 11 mg/L [flow-through]; LC50 96 h Lepomis macrochirus 32 mg/L [static]; LC50 96 h Pimephales promelas 9.1 - 15.6 mg/L [static]; LC50 96 h Poecilia reticulata 9.6 mg/L [static]
Algae:	EC50 72 h Pseudokirchneriella subcapitata 4.6 mg/L IUCLID ; EC50 96 h Pseudokirchneriella subcapitata >438 mg/L IUCLID ; EC50 72 h Pseudokirchneriella subcapitata 2.6 - 11.3 mg/L [static] EPA ; EC50 96 h Pseudokirchneriella subcapitata 1.7 - 7.6 mg/L [static] EPA
Invertebrate:	EC50 48 h Daphnia magna 1.8 - 2.4 mg/L IUCLID

Persistence and Degradability
Not expected to undergo hydrolysis in the environment.
Bioaccumulative Potential
Bioconcentration potential in aquatic organisms is low based on a BCF value of 15.
Mobility

Expected to have moderate mobility in soil.

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Methods
Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262.
Hazardous Waste Number(s): D001.
Component Waste Numbers
The U.S. EPA has not published waste numbers for this product's components.

Section 14 - TRANSPORT INFORMATION

US DOT Information:
Shipping Name: ETHYLBENZENE
Hazard Class: 3
UN/NA #: UN1175
Packing Group: II
Required Label(s): 3
Marine pollutant

IMDG Information:
Shipping Name: ETHYLBENZENE
Hazard Class: 3
UN#: UN1175
Packing Group: II
Required Label(s): 3
Marine pollutant
International Bulk Chemical Code
This material contains one or more of the following chemicals required by the IBC Code to be identified as dangerous chemicals in bulk.

ETHYL BENZENE	**100-41-4**
IBC Code:	Category Y

Section 15 - REGULATORY INFORMATION

U.S. Federal Regulations
This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

ETHYL BENZENE	**100-41-4**
SARA 313:	0.1 % de minimis concentration
CERCLA:	1000 lb final RQ ; 454 kg final RQ

SARA Section 311/312 (40 CFR 370 Subparts B and C) reporting categories
Flammable; Carcinogenicity; Acute toxicity; Reproductive Toxicity; Skin Corrosion/Irritation; Serious Eye Damage/Eye Irritation; Specific Target Organ Toxicity; Aspiration Hazard
U.S. State Regulations
The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA
ETHYL BENZENE	**100-41-4**	Yes	Yes	Yes	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):
WARNING! This product contains a chemical known to the state of California to cause cancer

ETHYL BENZENE	**100-41-4**
Carc:	carcinogen , 6/11/2004

Canada Regulations
Canadian WHMIS Ingredient Disclosure List (IDL)
Components of this material have been checked against the Canadian WHMIS Ingredients Disclosure List. The List is composed of chemicals which must be identified on MSDSs if they are included in products which meet WHMIS criteria specified in the Controlled Products Regulations and are present above the threshold limits listed on the IDL

ETHYL BENZENE	**100-41-4**
	0.1 %

WHMIS Classification
B2
Component Analysis - Inventory
ETHYL BENZENE (100-41-4)

US	CA	EU	AU	PH	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2	KR - REACH CCA	CN	NZ	MX	TW	VN - NCI (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes

Section 16 - OTHER INFORMATION

NFPA Ratings
Health: 2 Fire: 3 Reactivity: 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe
Summary of Changes
Updated: 05/01/2015
Key / Legend
ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CA/MA/MN/NJ/PA - California/Massachusetts/Minnesota/New Jersey/Pennsylvania*; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CFR - Code of Federal Regulations (US); CLP - Classification, Labelling, and Packaging; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSD - Dangerous Substance Directive; DSL - Domestic Substances List; EC – European Commission; EEC - European Economic Community; EIN - European Inventory of (Existing Commercial Chemical Substances); EINECS - European Inventory of Existing Commercial Chemical Substances; ENCS - Japan Existing and New Chemical Substance Inventory; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; IARC - International Agency for Research

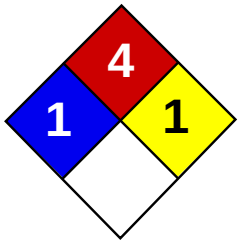
on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; ISHL - Japan Industrial Safety and Health Law; IUCLID - International Uniform Chemical Information Database; JP - Japan; Kow - Octanol/water partition coefficient; KR KECI Annex 1 - Korea Existing Chemicals Inventory (KECI) / Korea Existing Chemicals List (KECL); KR KECI Annex 2 - Korea Existing Chemicals Inventory (KECI) / Korea Existing Chemicals List (KECL) , KR - Korea; LD50/LC50 - Lethal Dose/ Lethal Concentration; LEL - Lower Explosive Limit; LLV - Level Limit Value; LOLI - List Of LIsts™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; MX – Mexico; NDSL – Non-Domestic Substance List (Canada); NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PEL- Permissible Exposure Limit; PH - Philippines; RCRA - Resource Conservation and Recovery Act; REACH- Registration, Evaluation, Authorisation, and restriction of Chemicals; RID - European Rail Transport; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TCCA – Korea Toxic Chemicals Control Act; TDG - Transportation of Dangerous Goods; TLV - Threshold Limit Value; TSCA - Toxic Substances Control Act; TW – Taiwan; TWA - Time Weighted Average; UEL - Upper Explosive Limit; UN/NA - United Nations /North American; US - United States; VLE - Exposure Limit Value (Mexico); VN NCI (Draft) - Vietnam National Chemicals Inventory (NCI) (Draft); WHMIS - Workplace Hazardous Materials Information System (Canada) .

Other Information

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Material Safety Data Sheet
Ethyl ether MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethyl ether

Catalog Codes: SLE2170, SLE1783, SLE1465

CAS#: 60-29-7

RTECS: KI5775000

TSCA: TSCA 8(b) inventory: Ethyl ether

CI#: Not available.

Synonym: Diethyl Ether; Ether

Chemical Name: Ethyl Ether

Chemical Formula: C4H10O

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ethyl ether	60-29-7	100

Toxicological Data on Ingredients: Ethyl ether: ORAL (LD50): Acute: 1215 mg/kg [Rat]. VAPOR (LC50): Acute: 73000 ppm 2 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to skin, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 180°C (356°F)

Flash Points: CLOSED CUP: -45°C (-49°F).

Flammable Limits: LOWER: 1.9% UPPER: 36%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Extremely flammable in presence of open flames and sparks, of heat. Slightly flammable to flammable in presence of oxidizing materials, of acids.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Highly explosive in presence of open flames and sparks, of heat. Slightly explosive in presence of oxidizing materials.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards:
Highly flammable. Will be easily ignited by heat, sparks, and flames. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. Burns with smokey greenish flame. Violent reaction or ignition on contact with halogens (e.g., bromine, chlorine), interhalogens (e.g., iodine heptafluoride), oxidants (e.g., silver perchlorate, nitrosyl perchlorate, nitryl perchlorate, chromyl chloride, fluorine nitrate, permanganic acid, nitric acid, hydrogen peroxide, peroxodisulfuric acid, iodine (VII) oxide, sodium peroxide, ozone, and liquid air), sulfur and sulfur compounds (e.g., sulfur when dried with peroxidized ether, sulfuryl chloride).

Special Remarks on Explosion Hazards:
Vapors may form explosive mixtures with air. Vapor explosion hazard indoors, outdoors, or in sewers. Run off to sewer may create a fire or explosion hazard. Containers may explode when heated. Tends to form explosive peroxides under influence of light and air and evaporated to dryness. Explosive reaction with boron triazide, bromine trifluoride, bromine pentafluoride,

perchloric acid, uranyl nitrate + light, wood pulp extracts + heat. Only electrical equipment of explosion proof type (group C classification) is permitted to be operated in ether areas. May explode when brought in contact with anhydrous nitric acid.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Do not store above 30°C (86°F). Hygroscopic; keep container tightly closed. Air Sensitive Sensitive to light.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 400 (ppm) from OSHA (PEL) [United States] TWA: 400 STEL: 500 CEIL: 500 (ppm) from ACGIH (TLV) [United States] TWA: 1200 STEL: 1520 CEIL: 1500 (mg/m3) from ACGIH (TLV) [United States] STEL: 500 (ppm) [Australia] TWA: 1200 (mg/m3) from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (volatile, mobile liquid)

Odor: Sweetish. Pungent. Ethereal.

Taste: Burning. Sweet.

Molecular Weight: 74.12g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 34.6°C (94.3°F)

Melting Point: -116.3°C (-177.3°F)

Critical Temperature: 192.7°C (378.9°F)

Specific Gravity: 0.7134 (Water = 1)

Vapor Pressure: 58.6 kPa (@ 20°C)

Vapor Density: 2.56 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.83 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 0.9

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, acetone.

Solubility:
Soluble in acetone. Partially soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatible materials, light, air.

Incompatibility with various substances: Highly reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Air and light sensitive. Hygroscopic. Also incompatiable with bromoazide, chlorine, chlorine trifluoride, chromic anhydride, chromyl chloride, lithium aluminum hydride, nitrosyl perchlorate, nitryl perchlorate, ozone, perchloric acid, permanganated, sulfuric acid, potassium peroxide, sodium peroxide, triethyl aluminum trimethyl aluminum, bromine, iodine heptaflluoride, silver perchlorate, fluorine nitrate, permanganic acid, nitric acid, hydrogen peroxide, peroxodisulfuric acid, iodine (VII) oxide, peat soils, thiotriazyl perchlorate, sulfonyl chloride, sulfur, uranyl nitrate, acetyl peroxide, and wood pulp extracts. Can react vigorously with acetyl peroxide, air, bromoazide, ClF3, CrO3, Cr(OCl)2, LiAlH2, NOClO4, O2, NClO2, (H2SO4 + permanganates), K2O2, [(C2H5)3Al + air], [(CH3)3Al + air].

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 1215 mg/kg [Rat]. Acute toxicity of the vapor (LC50): 31000 0.5 hours [Mouse].

Chronic Effects on Humans:
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: skin, central nervous system (CNS).

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals:
LD50 [Rabbit] -Route: Skin; Dose: >20 ml/kg LDL[Man] - Route: Oral; Dose: 260 mg/kg

Special Remarks on Chronic Effects on Humans: May affect genetic material (mutagenic) based on animal data.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation. It is not appreciably absorbed through intact skin. Eyes: Causes eye irritation. Can cause slight , reversible eye injury from contact with liquid or vapor. Inhalation: It is rapidly absorbed through lungs. Vapor mist causes irritation of the respiratory tract and mucous membranes. Affects behavior, sense organs, peripheral and central nervous systems, liver and metabolism, cardiovascular system. Symptoms may include excitement, drowsiness, headache, nausea, vomiting, paleness, decreased pulse and temperature, irregular respiration, coughing, bronchodilation, increase in respiratory rate, increase in heart rate, excessive salivation, muscle relaxation, anesthetic effects, and possible kidney irritation or injury, and temporarily abnormal liver function tests. Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation with nausea, vomiting

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation:
WHEN RELEASED INTO THE SOIL, THIS MATERIAL IS EXPECTED TO QUICKLY EVAPORAT WHEN RELEASED INTO THE SOIL, THIS MATERIAL IS EXPECTED TO LEACH INTO GROUNDWATER. WHEN RELEASED INTO THE SOIL, THIS MATERIAL IS NOT EXPECTED TO BIODEGRADE. WHEN RELEASED INTO WATER, THIS MATERIAL IS NOT EXPECTED TO BIODEGRADE. WHEN RELEASED INTO THE WATER, THIS MATERIAL IS EXPECTED TO HAV HALF-LIFE OF LESS THAN 1 DAY. WHEN RELEASED TO WATER, THIS MATERIAL IS EXP TO QUICKLY EVAPORATE. THIS MATERIAL IS NOT EXPECTED TO SIGNIFICANTLY BIOACCUMULATE. THIS MATERIAL HAS A LOG OCTANOL-WATER PARTITION COEFFICIENT LESS THAN 3.0. WHEN RELEASED INTO THE AIR, THIS MATERIAL IS EXPECTED TO BE READILY DEGRADED BY REACTION WITH PHOTOCHEMICALLY PRODUCED HYDROXYL RADICA WHEN RELEASED INTO THE AIR, THIS MATERIAL IS NOT EXPECTED TO BE DEGRADED B PHOTOLYSIS. WHEN RELEASED INTO THE AIR, THIS MATERIAL IS EXPECTED TO HAVE HALF-LIFE BETWEEN 1 AND 10 DAYS.

Section 13: Disposal Considerations

Waste Disposal:
Consult with Local and Regional (State) authorities (waste regulators). Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Diethyl ether UNNA: 1155 PG: I

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut hazardous material survey.: Ethyl ether Illinois toxic substances disclosure to employee act: Ethyl ether Illinois chemical safety act: Ethyl ether New York release reporting list: Ethyl ether Rhode Island RTK hazardous substances: Ethyl ether Pennsylvania RTK: Ethyl ether Florida: Ethyl ether Minnesota: Ethyl ether Massachusetts RTK: Ethyl ether Massachusetts spill list: Ethyl ether New Jersey: Ethyl ether New Jersey toxic catastrophe prevention act: Ethyl ether Louisiana spill reporting: Ethyl ether California Director's List of Hazardous Substances: Ethyl ether TSCA 8(b) inventory: Ethyl ether TSCA 4(a) proposed test rules: Ethyl ether TSCA 8(a) PAIR: Ethyl ether

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).

DSCL (EEC):
R12- Extremely flammable. R19- May form explosive peroxides. R22- Harmful if swallowed. S9- Keep container in a well-ventilated place. S16- Keep away from sources of ignition - No smoking. S29- Do not empty into drains. S33- Take precautionary measures against static discharges.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 4

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 4

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:18 PM

Last Updated: 05/21/2013 12:00 PM

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SAFETY DATA SHEET

Helium

Section 1. Identification

GHS product identifier : Helium

Chemical name : Helium

Other means of identification : helium (dot); Helium-4; He; o-Helium; UN 1046

Product use : Synthetic/Analytical chemistry.

Synonym : helium (dot); Helium-4; He; o-Helium; UN 1046

SDS # : 001025

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Emergency telephone number (with hours of operation) : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : GASES UNDER PRESSURE - Compressed gas

GHS label elements

Hazard pictograms :



Signal word : Warning

Hazard statements : Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction.

Prevention : Use and store only outdoors or in a well ventilated place.

Response : Not applicable.

Storage : Protect from sunlight. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Disposal : Not applicable.

Hazards not otherwise classified : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

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Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : Helium

Other means of identification : helium (dot); Helium-4; He; o-Helium; UN 1046

CAS number/other identifiers

CAS number : 7440-59-7

Product code : 001025

Ingredient name	%	CAS number
Helium	100	7440-59-7

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : No known significant effects or critical hazards.

Skin contact : Contact with rapidly expanding gas may cause burns or frostbite.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

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Section 4. First aid measures

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

Hazardous thermal decomposition products : No specific data.

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

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Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Helium	Oxygen Depletion [Asphyxiant]

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

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Section 8. Exposure controls/personal protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [Compressed gas.]

Color : Colorless.

Molecular weight : 4 g/mole

Molecular formula : He

Boiling/condensation point : -268.9°C (-452°F)

Melting/freezing point : -272.2°C (-458°F)

Critical temperature : -267.9°C (-450.2°F)

Odor : Odorless.

Odor threshold : Not available.

pH : Not available.

Flash point : [Product does not sustain combustion.]

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : Not available.

Vapor density : 0.14 (Air = 1) Liquid Density@BP: 7.8 lb/ft3 (125 kg/m3)

Specific Volume (ft ^{3}/lb) : 96.1538

Gas Density (lb/ft ^{3}) : 0.0104

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : Not available.

Partition coefficient: n-octanol/water : 0.28

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

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Section 9. Physical and chemical properties

SADT : Not available.

Viscosity : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

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Section 11. Toxicological information

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : No known significant effects or critical hazards.

Skin contact : Contact with rapidly expanding gas may cause burns or frostbite.

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

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Section 12. Ecological information

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Helium	0.28	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1046	UN1046	UN1046	UN1046	UN1046
UN proper shipping name	HELIUM, COMPRESSED	HELIUM, COMPRESSED	HELIUM, COMPRESSED	HELIUM, COMPRESSED	HELIUM, COMPRESSED
Transport hazard class(es)	2.2 	2.2 	2.2 	2.2 	2.2 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	**Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: 75 kg **Cargo aircraft** Quantity limitation: 150 kg	**Explosive Limit and Limited Quantity Index** 0.125 **Passenger Carrying Road or Rail Index** 75	-	-	**Passenger and Cargo Aircraft**Quantity limitation: 75 kg **Cargo Aircraft Only** Quantity limitation: 150 kg

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

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Section 14. Transport information

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Sudden release of pressure

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Helium	100	No.	Yes.	No.	No.	No.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

Canada inventory : This material is listed or exempted.

International regulations

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Section 15. Regulatory information

International lists : **Australia inventory (AICS)**: This material is listed or exempted.
China inventory (IECSC): This material is listed or exempted.
Japan inventory: Not determined.
Korea inventory: This material is listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): This material is listed or exempted.
Philippines inventory (PICCS): This material is listed or exempted.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

Canada

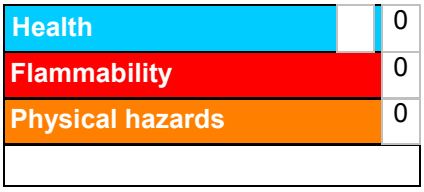
WHMIS (Canada) : Class A: Compressed gas.

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is not listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class A: Compressed gas.

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

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Section 16. Other information

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of printing : 10/15/2014.

Date of issue/Date of revision : 10/15/2014.

Date of previous issue : 10/2/2014.

Version : 0.02

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United NationsACGIH – American Conference of Governmental Industrial Hygienists
AIHA – American Industrial Hygiene Association
CAS – Chemical Abstract Services
CEPA – Canadian Environmental Protection Act
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)
CFR – United States Code of Federal Regulations
CPR – Controlled Products Regulations
DSL – Domestic Substances List
GWP – Global Warming Potential
IARC – International Agency for Research on Cancer
ICAO – International Civil Aviation Organisation
Inh – Inhalation
LC – Lethal concentration
LD – Lethal dosage
NDSL – Non-Domestic Substances List
NIOSH – National Institute for Occupational Safety and Health
TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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MATERIAL SAFETY DATA SHEET
HORIBA INSTRUMENTS, INC.
17671 Armstrong Avenue, Irvine, CA 92614
(949) 250-4811

REVISION DATE MAY 2003

SECTION I: MATERIAL IDENTIFICATION

IDENTITY: Potassium hydrogen phthalate
P/N 350623, 527033, 696138-1, 9003001600, 100-4

CHEMICAL FORMULA: $C_6H_4(COOK)(COOH)$ ~1% in water

GENERIC NAME: pH 4 Buffer Solution

CHEMICAL FAMILY: Salt solution

OTHER DESIGNATION: pH 4 Standard Solution, Autocal solution, 100-4

IN CASE OF EMERGENCY CONTACT YOUR REGIONAL PLANT MANAGER

SECTION II: HAZARDOUS INGREDIENTS

Irritant: Eyes, nose and throat, skin.

This product contains the following toxic chemical(s) subject to Section 313 Title III reporting requirements (40 CFR Part 372): NONE

SECTION III: PHYSICAL DATA

MELTING POINT (*): 295-300°C

SPECIFIC GRAVITY (H_2O = 1): 1.636

VAPOR PRESSURE: N/A

PERCENT, VOLATILE BY VOLUME (%): None

SOLUBILITY IN WATER v/v @°C: 1.2% (cool water) CAS #: 877-24-7

APPEARANCE AND ODOR: Colorless liquid

SECTION IV:PHYSICAL DATA

FLASH POINT AND METHOD: N/A

FLAMMABLE LIMITS: None

EXTINGUISHING MEDIA: Determine based on surrounding combustibles.

SPECIAL FIRE FIGHTING PROCEDURES: None

UNUSUAL FIRE AND EXPLOSION HAZARDS: N/A

SECTION V: REACTIVITY DATA

STABILITY: Stable at normal temperature

INCOMPATIBILITY (MATERIALS TO AVOID): None

HAZARDOUS DECOMPOSITION PRODUCTS: None

HAZARDOUS POLYMERIZATION: None

SECTION VI: HEALTH HAZARD DATA

EMERGENCY AND FIRST AID PROCEDURES:

Eyes:	Wash eyes with clean water flowing for 10-15 minutes. Call doctor immediately.
Skin:	Take off contaminated clothing and wash skin with water.
Inhaled:	Move the patient into clear air. Keep patient warm and stable. Loosen clothing and use artificial respiration if necessary. Call doctor immediately.
Swallowed:	Give patient plenty of warm water/milk. Induce vomiting. Call doctor immediately. If patient is unconscious, do not give water/milk, but call doctor immediately.

SECTION VII: SPILL OR LEAK PROCEDURES

Highway or railway spills call Chemtrec (800) 424-9300

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
Collect as much material as possible. The place of leakage should be washed with plenty of water.

WASTE DISPOSAL METHOD:
Dispose as chemical waste.

SECTION VIII: SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE):	Not normally required.
VENTILATION:	Not normally required.
OTHER PROTECTIVE EQUIPMENT:	Optional - eye mask, gloves and long-sleeve working clothes.

SECTION IX:SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING:
After working, wash hands thoroughly.

OTHER PRECAUTIONS: None.

Safety Data Sheet

20ppm Hydrogen Sulfide, 60ppm Carbon Monoxide, 58% LEL Pentane Simulant, 15% VOL Oxygen; balance Nitrogen

Ideal Calibrations, LLC
2750 Oakwood Blvd.
Melvindale, MI 48122
(734) 956-0539
http://www.idealcalibrations.com/

Section 1: Product and Company Identification

Ideal Calibrations, LLC
2750 Oakwood Blvd.
Melvindale, MI 48122
(734) 956-0539
http://www.idealcalibrations.com/

Product Code: 20ppm Hydrogen Sulfide, 60ppm Carbon Monoxide, 58% LEL Pentane Simulant, 15% VOL Oxygen; balance Nitrogen
Part Number: 0219

Synonyms:
Recommended Use: Calibration of gas detection devices
Usage Restrictions: Do not use if current date is past expiration date on cylinder

Section 2: Hazards Identification



Warning

Hazard Classification:
Gases Under Pressure

Hazard Statements:
Contains gas under pressure; may explode if heated
Toxic to aquatic life

Precautionary Statements

Storage:
Protect from sunlight.
Store in well-ventilated place.

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Section 3: Composition/Information on Ingredients

	CAS #	Concentration
Hydrogen Sulfide	7783-06-4	0.002
Carbon Monoxide	630-08-0	0.006
Methane	74-82-8	1.45
Oxygen	7782-44-7	15
Nitrogen	7727-37-9	83.542

	Chemical Substance	Chemical Family	Trade Names
Hydrogen Sulfide	HYDROGEN SULFIDE	Inorganic gases	HYDROGEN SULFIDE (H2S); DIHYDROGEN MONOSULFIDE; DIHYDROGEN SULFIDE; HYDROSULFURIC ACID; SULFUR DIHYDRIDE; SULFURETED HYDROGEN; SULFUR HYDRIDE; STINK DAMP; SEWER GAS; RCRA U135; UN 1053; H2S
Carbon Monoxide	CARBON MONOXIDE	Inorganic gases	CARBON OXIDE; CARBON OXIDE (CO); UN 1016; CO
Methane	METHANE, COMPRESSED GAS	Hydrocarbons, Aliphatic, Saturated	FIRE DAMP; MARSH GAS; METHYL HYDRIDE; NATURAL GAS; METHANE; UN 1971; R50; CH4
Oxygen	OXYGEN, COMPRESSED GAS	Inorganic gases	OXYGEN; DIOXYGEN; MOLECULAR OXYGEN; OXYGEN MOLECULE; PURE OXYGEN; UN 1072; O2
Nitrogen	NITROGEN, COMPRESSED GAS	Inorganic gases	DIATOMIC NITROGEN; DINITROGEN; NITROGEN; NITROGEN-14; NITROGEN GAS; UN 1066; N2

Section 4: First Aid Measures

	Skin Contact	Eye Contact	Ingestion	Inhalation	Note to Physicians
Hydrogen Sulfide	Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.	Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.
Carbon Monoxide	Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.	Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.
Methane	Wash exposed skin with soap and water.	Flush eyes with plenty of water.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.
Oxygen	None expected	None expected	Not likely route of exposure	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.	None

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	Skin Contact	Eye Contact	Ingestion	Inhalation	Note to Physicians
Nitrogen	Wash exposed skin with soap and water.	Flush eyes with plenty of water.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.

Section 5: Fire Fighting Measures

	Suitable Extinguishing Media	Products of Combustion	Protection of Firefighters
Hydrogen Sulfide	Let burn unless leak can be stopped immediately. Large fires: Use regular foam or flood with fine water spray.	Sulfur oxides	▪ Any self-contained breathing apparatus with a full facepiece. ▪ Protective material types: butyl rubber, polyvinyl chloride (PVC), neoprene
Carbon Monoxide	Carbon dioxide, regular dry chemical Large fires: Use regular foam or flood with fine water spray.	Carbon dioxide	▪ Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. ▪ Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Methane	Carbon dioxide, regular dry chemical Large fires: Use regular foam or flood with fine water spray.	Carbon monoxide, carbon dioxide, water	▪ Respiratory protection may be needed for frequent or heavy exposure. Any self-contained breathing apparatus with a full facepiece. ▪ Respiratory protection may be needed for frequent or heavy exposure. Any self-contained breathing apparatus with a full facepiece.
Oxygen	Non-flammable. Use extinguishing agent appropriate for the material which is burning. Use water in large quantities for fires involving oxygen.	Oxides of burning material	▪ Respiratory protection may be needed for frequent or heavy exposure. ▪ None
Nitrogen	Non-flammable. Use suitable extinguishing media for surrounding fire. Cylinders may rupture or explode if exposed to heat.	Non-flammable	▪ Respiratory protection may be needed for frequent or heavy exposure.

Section 6: Accidental Release Measures

	Personal Precautions	Environmental Precautions	Methods for Containment
Hydrogen Sulfide	Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. Ventilate closed spaces before entering. Evacuation radius: 150 feet. For tank, rail car or tank truck: 800 meters (1/2 mile). Do not touch spilled material.	Avoid heat, flames, sparks and other sources of ignition.	Stop leak if possible without personal risk. Remove sources of ignition. Reduce vapors with water spray. Do not get water directly on material.
Carbon Monoxide	Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering.	Avoid heat, flames, sparks and other sources of ignition. Keep out of water supplies and sewers.	Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition.
Methane	Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering.	Avoid heat, flames, sparks and other sources of ignition.	Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition.
Oxygen	Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering.	Avoid contact with combustible materials.	Stop leak if possible without personal risk.
Nitrogen	Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas.	No significant effects from contamination expected.	Stop leak if possible without personal risk.

	Methods for Cleanup	Other Information

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	Methods for Cleanup	Other Information
Hydrogen Sulfide	Collect runoff for disposal as potential hazardous waste. Dike for later disposal. Absorb with sand or other non-combustible material. Add an alkaline material (lime, crushed limestone, sodium bicarbonate, or soda ash).	Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).
Carbon Monoxide	Stop leak, evacuate area. Wear protective equipment.	Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).
Methane	Not available	Not available
Oxygen	Stop leak and ventilate	None
Nitrogen	N/A	N/A

Section 7: Handling and Storage

	Handling	Storage
Hydrogen Sulfide	Store and handle in accordance with all current regulations and standards. Protect from physical damage. Store outside or in a detached building. Store in a cool, dry place. Store in a well-ventilated area. Avoid contact with light. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Notify State Emergency Response Commission for storage or use at amounts greater than or equal to the TPQ (U.S. EPA SARA Section 302). SARA Section 303 requires facilities storing a material with a TPQ to participate in local emergency response planning (U.S. EPA 40 CFR 355.30). Keep separated from incompatible substances.	Subject to handling regulations: U.S. OSHA 29 CFR 1910.119.
Carbon Monoxide	Keep separated from incompatible substances.	Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.
Methane	Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.	Keep separated from incompatible substances.
Oxygen	Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.	Keep separated from incompatible substances.
Nitrogen	Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.	Keep separated from incompatible substances.

Section 8: Exposure Controls/Personal Protection

	Exposure Guidelines
Hydrogen Sulfide	HYDROGEN SULFIDE: 20 ppm OSHA ceiling 50 ppm OSHA peak 10 minute(s) (once if no other measurable exposure occurs) 10 ppm (14 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 15 ppm (21 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993) 10 ppm ACGIH TWA 15 ppm ACGIH STEL 10 ppm (15 mg/m3) NIOSH recommended ceiling 10 minute(s) TLV-TWA: 1ppm Upper respiratory irritation (ACGIH)
Carbon Monoxide	CARBON MONOXIDE: 50 ppm (55 mg/m3) OSHA TWA 35 ppm (40 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 200 ppm (229 mg/m3) OSHA ceiling (vacated by 58 FR 35338, June 30, 1993) 25 ppm ACGIH TWA 35 ppm (40 mg/m3) NIOSH recommended TWA 10 hour(s) 200 ppm (229 mg/m3) NIOSH recommended ceiling
Methane	METHANE, COMPRESSED GAS: ALIPHATIC HYDROCARBON GASES ALKANE (C1-C4): 1000 ppm ACGIH TWA METHANE: No occupational exposure limits established. ALIPHATIC HYDROCARBON GASES ALKANE (C1-C4): 1000 ppm ACGIH TWA
Oxygen	OXYGEN, COMPRESSED GAS: No occupational exposure limits established.
Nitrogen	NITROGEN, COMPRESSED GAS: NITROGEN: ACGIH (simple asphyxiant)

Engineering Controls

Handle only in fully enclosed systems.

	Eye Protection	Skin Protection	Respiratory Protection
Hydrogen Sulfide	Wear splash resistant safety goggles with a face shield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.	Wear appropriate chemical resistant clothing.	Any self-contained breathing apparatus with a full facepiece.
Carbon Monoxide	Eye protection not required, but recommended.	Protective clothing is not required.	Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.

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	Eye Protection	Skin Protection	Respiratory Protection
Methane	Eye protection not required, but recommended.	Protective clothing is not required.	Respiratory protection may be needed for frequent or heavy exposure. Any self-contained breathing apparatus with a full facepiece.
Oxygen	Eye protection not required, but recommended.	Protective clothing is not required.	Respiratory protection may be needed for frequent or heavy exposure.
Nitrogen	Eye protection not required, but recommended.	Protective clothing is not required.	Respiratory protection may be needed for frequent or heavy exposure.

General Hygiene considerations

- Avoid breathing vapor or mist
- Avoid contact with eyes and skin
- Wash thoroughly after handling and before eating or drinking

Section 9: Physical and Chemical Properties

	Physical State	Appearance	Color	Change in Appearance	Physical Form	Odor	Taste
Hydrogen Sulfide	Gas	Colorless	Colorless	N/A	Gas	Rotten egg odor	N/A
Carbon Monoxide	Gas	Colorless	Colorless	N/A	Gas	Odorless	Tasteless
Methane	Gas	Colorless	Colorless	N/A	Gas	Odorless	Tasteless
Oxygen	Gas	Clear	Colorless	N/A	Gas	Odorless	Tasteless
Nitrogen	Gas	Clear	Colorless	N/A	Gas	Odorless	Tasteless

	Flash Point	Flammability	Partition Coefficient	Autoignition Temperature	Upper Explosive Limits	Lower Explosive Limits
Hydrogen Sulfide	Flammable	Not available	Not available	500 F (260 C)	45.5%	3.9%
Carbon Monoxide	Flammable	Not available	1479.11 (log = 3.17) (estimated from water solubility)	1128-1202 F (609-650 C)	0.74	12.0-12.5%
Methane	-369 F (-223 C)	Not available	724.44 (log = 2.87) (estimated from water solubility)	999 F (537 C)	15%	5%
Oxygen	Not flammable	Not available	Not available	Nonflammable	Nonflammable	Nonflammable
Nitrogen	Not flammable	Not available	Not available	Nonflammable	Nonflammable	Nonflammable

	Boiling Point	Freezing Point	Vapor Pressure	Vapor Density	Specific Gravity	Water Solubility	pH	Odor Threshold	Evaporation Rate	Viscosity
Hydrogen Sulfide	-78 to -77 F (-61 to -60.3 C)	-123 F (-86 C)	15200 mmHg @ 25 C	1.2 (Air=1)	1.192	2.58-2.9% @ 20 C	4.5-<7 (saturated solution)	0.13 ppm	Not applicable	0.0128 cP @ 25 C
Carbon Monoxide	-312.7 F (-191.5 C)	-326 F (-199 C)	760 mmHg @ -191 C gas; cannot be liquefied at room temperature	0.968 (Air=1)	Not applicable	2.3% @ 20 C	Not applicable	Not available	Not applicable	0.01657 cP @ 0 C
Methane	-260 F (-162 C)	-297 F (-183 C)	760 mmHg @ -161 C	0.555 (Air=1)	Not applicable	3.5% @ 17 C	Not applicable	Not available	Not applicable	0.01118 cP @ 27 C
Oxygen	-297 F (-183 C)	-360 F (-218 C)	760 mmHg @ -183 C	1.1 (Air=1)	Not applicable	3.2% @ 25 C	Not applicable	Not available	Not applicable	0.02075 cP @ 25 C
Nitrogen	-321 F (-196 C)	-346 F (-210 C)	760 mmHg @ -196 C	0.967 (Air=1)	Not applicable	1.6% @ 20 C	Not applicable	Not available	Not applicable	0.01787 cP @ 27 C

	Molecular Weight	Molecular Formula	Density	Weight per Gallon	Volatility by Volume	Volatility	Solvent Solubility

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	Molecular Weight	Molecular Formula	Density	Weight per Gallon	Volatility by Volume	Volatility	Solvent Solubility
Hydrogen Sulfide	34.08	H2-S	1.539 g/L @ 0 C	Not available	Not available	Not applicable	Soluble: Carbon disulfide, alcohol, ether, glycerol, gasolines, kerosene, crude oil, alkali solutions
Carbon Monoxide	28.01	C-O	1.250 g/L @ 0 C	Not available	100%	Not applicable	Soluble: Alcohol, benzene, acetic acid, ethyl acetate, chloroform, cuprous chloride solutions
Methane	16.04	C-H4	0.717 g/L @ 0 C	Not available	Not applicable	Not applicable	Soluble: Alcohol, ether, benzene, organic solvents
Oxygen	31.9988	O2	1.309 g/L @ 25 C	Not available	Not applicable	Not applicable	Soluble: Alcohol
Nitrogen	28.0134	N2	1.2506 g/L	Not available	100%	1	Soluble: Liquid ammonia

Section 10: Stability and Reactivity

	Stability	Conditions to Avoid	Incompatible Materials
Hydrogen Sulfide	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Combustible materials, metals, oxidizing materials, halogens, metal oxides, metal salts, bases, rust, oxidants, oxygen, copper powder, acetaldehyde, silver fulminate
Carbon Monoxide	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Oxidizing materials, halogens, metal oxides, metals, combustible materials, lithium
Methane	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Halogens, oxidizing materials, combustible materials
Oxygen	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Combustible materials, halo carbons, metals, bases, reducing agents, amines, metal salts, oxidizing materials, alkaline earth and alkali metals
Nitrogen	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Metals, oxidizing materials

	Hazardous Decomposition Products	Possibility of Hazardous Reactions
Hydrogen Sulfide	Oxides of sulfur	Will not polymerize.
Carbon Monoxide	Oxides of carbon	Will not polymerize.
Methane	Oxides of carbon	Will not polymerize.
Oxygen	Miscellaneous decomposition products	Will not polymerize.
Nitrogen	Oxides of nitrogen	Will not polymerize.

Section 11: Toxicology Information

Acute Effects

	Oral LD50	Dermal LD50	Inhalation
Hydrogen Sulfide	444 ppm inhalation-rat LC50	Irritation 0.000125 ppm/5 hour(s) eyes-human	Irritation, lack of sense of smell, sensitivity to light, nausea, vomiting, difficulty breathing, headache, drowsiness, dizziness, disorientation, tremors, visual disturbances, suffocation, lung congestion, internal bleeding, heart damage, nerve damage, brain damage, coma, death
Carbon Monoxide	LC50 Inhalation Gas. Rat 1807 ppm 4 hours	Not available	Changes in body temperature, changes in blood pressure, nausea, vomiting, chest pain, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, disorientation, hallucinations, pain in extremities, tremors, loss of coordination, hearing loss, visual disturbances, eye damage, suffocation, blood disorders, convulsions, coma
Methane	Not available	Not available	Nausea, vomiting, difficulty breathing, irregular heartbeat, headache, drowsiness, fatigue, dizziness, disorientation, mood swings, tingling sensation, loss of coordination, suffocation, convulsions, unconsciousness, coma
Oxygen	Not established	Not established	Irritation, changes in body temperature, nausea, difficulty breathing, irregular heartbeat, dizziness, disorientation, hallucinations, mood swings, pain in extremities, tremors, lung congestion, convulsions
Nitrogen	Not available	Not available	Nausea, vomiting, difficulty breathing, headache, drowsiness, dizziness, tingling sensation, loss of coordination, convulsions, coma

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	Eye Irritation	Skin Irritation	Sensitization
Hydrogen Sulfide	Irritation, sensitivity to light, visual disturbances	Irritation liquid: frostbite	Acute toxicity, Category 2, inhalation; H330: Fatal if inhaled. Specific Target Organ Toxicity (single exposure), Category 3; H335: May cause respiratory irritation. Hazardous to the aquatic environment, Acute Category 1; H400: Very toxic to aquatic life
Carbon Monoxide	No information on significant adverse effects	No information on significant adverse effects	Acute toxicity, Category 3, inhalation; H331: Toxic if inhaled. Reproductive toxicity, Category 1A; H360D: May damage the unborn child. Specific Target Organ Toxicity (repeated exposure), Category 1; H372: Causes damage to organs through prolonged or repeated exposure.
Methane	No information on significant adverse effects	No information on significant adverse effects	Difficulty breathing
Oxygen	No information on significant adverse effects	No information on significant adverse effects	No significant target effects reported.
Nitrogen	Contact with rapidly expanding gas may cause burns or frostbite	No information on significant adverse effects	Difficulty breathing

Chronic Effects

	Carcinogenicity	Mutagenicity	Reproductive Effects	Developmental Effects
Hydrogen Sulfide	Not available	Not available	Available.	No data
Carbon Monoxide	Not available	Available.	Available.	No data
Methane	Not available	Not available	Not available	No data
Oxygen	Not known.	Available.	Available.	No data
Nitrogen	Not hazardous	Not available	Not available	No data

Section 12: Ecological Information

Fate and Transport

	Eco toxicity	Persistence / Degradability	Bioaccumulation / Accumulation	Mobility in Environment
Hydrogen Sulfide	Fish toxicity: Acute LC50 7 ug/L Fresh water Fish - Fathead minnow - Pimephales promelas - FRY 96 hours; 14.9 ug/L 96 hour(s) LC50 (Mortality) Fathead minnow (Pimeph Invertibrate toxicity: 9730 ug/L 1.5 hour(s) (Mortality) Mediterranean mussel (Mytilus galloprovincialis) Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Highly toxic to aquatic life.	Not available	Not available
Carbon Monoxide	Fish toxicity: 75000 ug/L 1 day(s) LC100 (Mortality) Orangespotted sunfish (Lepomis humilis) Invertibrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Relatively non-persistent in the environment. Highly volatile from water.	Not available	Not expected to leach through the soil or the sediment.
Methane	Fish toxicity: Not available Invertibrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Relatively non-persistent in the environment. Moderately volatile from water.	Accumulates very little in the bodies of living organisms.	Not expected to leach through the soil or the sediment.
Oxygen	Fish toxicity: Not available Invertibrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Not available	Low bioaccumulation	Not available
Nitrogen	Fish toxicity: Not available Invertibrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Not available	Not available	Not available

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Section 13: Disposal Considerations

Hydrogen Sulfide	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U135.
Carbon Monoxide	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.
Methane	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.
Oxygen	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.
Nitrogen	Dispose in accordance with all applicable regulations.

Section 14: Transportation Information

U.S. DOT 49 CFR 172.101

DOT Information For This Mixture

Shipping Name	Compressed gas, n.o.s. (Nitrogen, Oxygen)
UN Number	UN1956
Hazard Class	2.2
Hazard Information	Non-Flammable Gas

Individual Component Information

	Proper Shipping Name	ID Number	Hazard Class or Division	Packing Group	Labeling Requirements	Passenger Aircraft or Railcar Quantity Limitations	Cargo Aircraft Only Quantity Limitations	Additional Shipping Description
Hydrogen Sulfide	Hydrogen sulfide	UN1053	2.3	Not applicable	2.3; 2.1	Forbidden	Forbidden	Toxic-Inhalation Hazard Zone B
Carbon Monoxide	Carbon monoxide, compressed	UN1016	2.3	Not applicable	2.3; 2.1	Forbidden	25 kg	Toxic-Inhalation Hazard Zone D
Methane	Methane, compressed	UN1971	2.1	Not applicable	2.1	Forbidden	150 kg	N/A
Oxygen	Oxygen, compressed	UN1072	2.2	Not available	2.2; 5.1	75 kg or L	150 kg	N/A
Nitrogen	Nitrogen, compressed	UN1066	2.2	Not applicable	2.2	75 kg or L	150 kg	N/A

Canadian Transportation of Dangerous Goods

	Shipping Name	UN Number	Class	Packing Group / Risk Group
Hydrogen Sulfide	HYDROGEN SULFIDE; or HYDROGEN SULPHIDE	UN1053	2.3; 2.1	Not applicable
Carbon Monoxide	Carbon monoxide, compressed	UN1016	2.3; 2.1	Not applicable
Methane	Methane, compressed	UN1971	2.1	Not applicable
Oxygen	Oxygen, compressed	UN1072	2.2; 5.1	Not applicable
Nitrogen	Nitrogen, compressed	UN1066	2.2	Not applicable

Section 15: Regulatory Information

U.S. Regulations

	CERCLA Sections	SARA 355.30	SARA 355.40
Hydrogen Sulfide	100 LBS RQ	500 LBS TPQ	100 LBS RQ
Carbon Monoxide	Not regulated.	Not regulated.	Not regulated.
Methane	Not regulated.	Not regulated.	Not regulated.
Oxygen	Not regulated.	Not regulated.	Not regulated.

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Nitrogen	Not regulated.	Not regulated.	Not regulated.

SARA 370.21

	Acute	Chronic	Fire	Reactive	Sudden Release
Hydrogen Sulfide	Yes	No	Yes	No	Yes
Carbon Monoxide	Yes	No	Yes	No	Yes
Methane	Yes	No	Yes	No	Yes
Oxygen	No	No	Yes	No	Yes
Nitrogen	Yes	No	No	No	Yes

SARA 372.65

Hydrogen Sulfide	HYDROGEN SULFIDE: Administrative stay issued Aug. 22, 1994
Carbon Monoxide	Not regulated.
Methane	Not regulated.
Oxygen	Not regulated.
Nitrogen	Not regulated.

OSHA Process Safety

Hydrogen Sulfide	1500 LBS TQ
Carbon Monoxide	Not regulated.
Methane	Not regulated.
Oxygen	Not regulated.
Nitrogen	Not regulated.

State Regulations

	CA Proposition 65
Hydrogen Sulfide	Not regulated.
Carbon Monoxide	WARNING: This product can expose you to chemicals including Carbon Monoxide, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.
Methane	Not regulated.
Oxygen	Not regulated.
Nitrogen	Not regulated.

Canadian Regulations

	WHMIS Classification
Hydrogen Sulfide	A, B1, D1A, D2B.
Carbon Monoxide	A, B1, D1A, D2A.
Methane	A, B1
Oxygen	A,C
Nitrogen	A

National Inventory Status

	US Inventory (TSCA)	TSCA 12b Export Notification	Canada Inventory (DSL/NDSL)
Hydrogen Sulfide	Listed on inventory.	Not listed.	Listed on inventory.
Carbon Monoxide	Listed on inventory.	Not listed.	Listed on inventory.
Methane	Listed on inventory.	Not listed.	Listed on inventory.
Oxygen	Listed on inventory.	Not listed.	Not determined.
Nitrogen	Listed on inventory.	Not listed.	Listed on inventory.

Section 16: Other Information

	NFPA Rating
Hydrogen Sulfide	HEALTH=4 FIRE=4 REACTIVITY=0
Carbon Monoxide	HEALTH=2 FIRE=4 REACTIVITY=0
Methane	HEALTH=0 FIRE=4 REACTIVITY=0
Oxygen	HEALTH=0 FIRE=0 REACTIVITY=0 SPECIAL=OX
Nitrogen	HEALTH=0 FIRE=0 REACTIVITY=0 SPECIAL=SA

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard

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Safety Data Sheet

20ppm Hydrogen Sulfide, 60ppm Carbon Monoxide, 58% LEL Pentane Simulant, 15.0% VOL Oxygen, 2.5% VOL Carbon Dioxide; balance Nitrogen

Ideal Calibrations, LLC
2750 Oakwood Blvd.
Melvindale, MI 48122
(734) 956-0539
http://www.idealcalibrations.com/

Section 1: Product and Company Identification

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Product Code: 20ppm Hydrogen Sulfide, 60ppm Carbon Monoxide, 58% LEL Pentane Simulant, 15.0% VOL Oxygen, 2.5% VOL Carbon Dioxide; balance Nitrogen
Part Number: 0522

Synonyms:
Recommended Use: Calibration of gas detection devices
Usage Restrictions: Do not use if current date is past expiration date on cylinder

Section 2: Hazards Identification



Warning

Hazard Classification:
Gases Under Pressure

Hazard Statements:
Contains gas under pressure; may explode if heated
Toxic to aquatic life

Precautionary Statements

Storage:
Protect from sunlight.
Store in well-ventilated place.

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Section 3: Composition/Information on Ingredients

	CAS #	Concentration
Hydrogen Sulfide	7783-06-4	0.002
Carbon Monoxide	630-08-0	0.006
Methane	74-82-8	1.45
Oxygen	7782-44-7	15
Carbon Dioxide	124-38-9	2.5
Nitrogen	7727-37-9	81.042

	Chemical Substance	Chemical Family	Trade Names
Hydrogen Sulfide	HYDROGEN SULFIDE	Inorganic gases	HYDROGEN SULFIDE (H2S); DIHYDROGEN MONOSULFIDE; DIHYDROGEN SULFIDE; HYDROSULFURIC ACID; SULFUR DIHYDRIDE; SULFURETED HYDROGEN; SULFUR HYDRIDE; STINK DAMP; SEWER GAS; RCRA U135; UN 1053; H2S
Carbon Monoxide	CARBON MONOXIDE	Inorganic gases	CARBON OXIDE; CARBON OXIDE (CO); UN 1016; CO
Methane	METHANE, COMPRESSED GAS	Hydrocarbons, Aliphatic, Saturated	FIRE DAMP; MARSH GAS; METHYL HYDRIDE; NATURAL GAS; METHANE; UN 1971; R50; CH4
Oxygen	OXYGEN, COMPRESSED GAS	Inorganic gases	OXYGEN; DIOXYGEN; MOLECULAR OXYGEN; OXYGEN MOLECULE; PURE OXYGEN; UN 1072; O2
Carbon Dioxide	CARBON DIOXIDE, GAS	Inorganic gases	CARBONIC ACID GAS; CARBONIC ANHYDRIDE; CARBON DIOXIDE; CARBON OXIDE; UN 1013; CO2
Nitrogen	NITROGEN, COMPRESSED GAS	Inorganic gases	DIATOMIC NITROGEN; DINITROGEN; NITROGEN; NITROGEN-14; NITROGEN GAS; UN 1066; N2

Section 4: First Aid Measures

	Skin Contact	Eye Contact	Ingestion	Inhalation	Note to Physicians
Hydrogen Sulfide	Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.	Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.
Carbon Monoxide	Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.	Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.
Methane	Wash exposed skin with soap and water.	Flush eyes with plenty of water.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.

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	Skin Contact	Eye Contact	Ingestion	Inhalation	Note to Physicians
Oxygen	None expected	None expected	Not likely route of exposure	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.	None
Carbon Dioxide	If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.	Contact with liquid: Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.	Do not induce vomiting.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.
Nitrogen	Wash exposed skin with soap and water.	Flush eyes with plenty of water.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.

Section 5: Fire Fighting Measures

	Suitable Extinguishing Media	Products of Combustion	Protection of Firefighters
Hydrogen Sulfide	Let burn unless leak can be stopped immediately. Large fires: Use regular foam or flood with fine water spray.	Sulfur oxides	▪ Any self-contained breathing apparatus with a full facepiece. ▪ Protective material types: butyl rubber, polyvinyl chloride (PVC), neoprene
Carbon Monoxide	Carbon dioxide, regular dry chemical Large fires: Use regular foam or flood with fine water spray.	Carbon dioxide	▪ Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. ▪ Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Methane	Carbon dioxide, regular dry chemical Large fires: Use regular foam or flood with fine water spray.	Carbon monoxide, carbon dioxide, water	▪ Respiratory protection may be needed for frequent or heavy exposure. Any self-contained breathing apparatus with a full facepiece. ▪ Respiratory protection may be needed for frequent or heavy exposure. Any self-contained breathing apparatus with a full facepiece.
Oxygen	Non-flammable. Use extinguishing agent appropriate for the material which is burning. Use water in large quantities for fires involving oxygen.	Oxides of burning material	▪ Respiratory protection may be needed for frequent or heavy exposure. ▪ None
Carbon Dioxide	Non-flammable	Non-flammable	▪ Any appropriate escape-type, self-contained breathing apparatus. ▪ Non-flammable
Nitrogen	Non-flammable. Use suitable extinguishing media for surrounding fire. Cylinders may rupture or explode if exposed to heat.	Non-flammable	▪ Respiratory protection may be needed for frequent or heavy exposure.

Section 6: Accidental Release Measures

	Personal Precautions	Environmental Precautions	Methods for Containment

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	Personal Precautions	Environmental Precautions	Methods for Containment
Hydrogen Sulfide	Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. Ventilate closed spaces before entering. Evacuation radius: 150 feet. For tank, rail car or tank truck: 800 meters (1/2 mile). Do not touch spilled material.	Avoid heat, flames, sparks and other sources of ignition.	Stop leak if possible without personal risk. Remove sources of ignition. Reduce vapors with water spray. Do not get water directly on material.
Carbon Monoxide	Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering.	Avoid heat, flames, sparks and other sources of ignition. Keep out of water supplies and sewers.	Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition.
Methane	Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering.	Avoid heat, flames, sparks and other sources of ignition.	Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition.
Oxygen	Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering.	Avoid contact with combustible materials.	Stop leak if possible without personal risk.
Carbon Dioxide	Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. Do not touch spilled material.	Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.	Stop leak if possible without personal risk.
Nitrogen	Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas.	No significant effects from contamination expected.	Stop leak if possible without personal risk.

	Methods for Cleanup	Other Information
Hydrogen Sulfide	Collect runoff for disposal as potential hazardous waste. Dike for later disposal. Absorb with sand or other non-combustible material. Add an alkaline material (lime, crushed limestone, sodium bicarbonate, or soda ash).	Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).
Carbon Monoxide	Stop leak, evacuate area. Wear protective equipment.	Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).
Methane	Not available	Not available
Oxygen	Stop leak and ventilate	None
Carbon Dioxide	Stop leak, evacuate, remove source of ignition.	None
Nitrogen	N/A	N/A

Section 7: Handling and Storage

	Handling	Storage
Hydrogen Sulfide	Store and handle in accordance with all current regulations and standards. Protect from physical damage. Store outside or in a detached building. Store in a cool, dry place. Store in a well-ventilated area. Avoid contact with light. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Notify State Emergency Response Commission for storage or use at amounts greater than or equal to the TPQ (U.S. EPA SARA Section 302). SARA Section 303 requires facilities storing a material with a TPQ to participate in local emergency response planning (U.S. EPA 40 CFR 355.30). Keep separated from incompatible substances.	Subject to handling regulations: U.S. OSHA 29 CFR 1910.119.
Carbon Monoxide	Keep separated from incompatible substances.	Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.
Methane	Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.	Keep separated from incompatible substances.
Oxygen	Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.	Keep separated from incompatible substances.
Carbon Dioxide	Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Keep separated from incompatible substances.	Store and handle in accordance with all current regulations and standards
Nitrogen	Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.	Keep separated from incompatible substances.

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Section 8: Exposure Controls/Personal Protection

	Exposure Guidelines
Hydrogen Sulfide	HYDROGEN SULFIDE: 20 ppm OSHA ceiling 50 ppm OSHA peak 10 minute(s) (once if no other measurable exposure occurs) 10 ppm (14 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 15 ppm (21 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993) 10 ppm ACGIH TWA 15 ppm ACGIH STEL 10 ppm (15 mg/m3) NIOSH recommended ceiling 10 minute(s) TLV-TWA: 1ppm Upper respiratory irritation (ACGIH)
Carbon Monoxide	CARBON MONOXIDE: 50 ppm (55 mg/m3) OSHA TWA 35 ppm (40 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 200 ppm (229 mg/m3) OSHA ceiling (vacated by 58 FR 35338, June 30, 1993) 25 ppm ACGIH TWA 35 ppm (40 mg/m3) NIOSH recommended TWA 10 hour(s) 200 ppm (229 mg/m3) NIOSH recommended ceiling
Methane	METHANE, COMPRESSED GAS: ALIPHATIC HYDROCARBON GASES ALKANE (C1-C4): 1000 ppm ACGIH TWA METHANE: No occupational exposure limits established. ALIPHATIC HYDROCARBON GASES ALKANE (C1-C4): 1000 ppm ACGIH TWA
Oxygen	OXYGEN, COMPRESSED GAS: No occupational exposure limits established.
Carbon Dioxide	CARBON DIOXIDE, GAS: CARBON DIOXIDE: 5000 ppm (9000 mg/m3) OSHA TWA 10000 ppm (18000 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 30000 ppm (54000 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993) 5000 ppm ACGIH TWA 30000 ppm ACGIH STEL 5000 ppm (9000 mg/m3) NIOSH recommended TWA 10 hour(s) 30000 ppm (54000 mg/m3) NIOSH recommended STEL
Nitrogen	NITROGEN, COMPRESSED GAS: NITROGEN: ACGIH (simple asphyxiant)

Engineering Controls

Handle only in fully enclosed systems.

	Eye Protection	Skin Protection	Respiratory Protection
Hydrogen Sulfide	Wear splash resistant safety goggles with a face shield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.	Wear appropriate chemical resistant clothing.	Any self-contained breathing apparatus with a full facepiece.
Carbon Monoxide	Eye protection not required, but recommended.	Protective clothing is not required.	Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Methane	Eye protection not required, but recommended.	Protective clothing is not required.	Respiratory protection may be needed for frequent or heavy exposure. Any self-contained breathing apparatus with a full facepiece.
Oxygen	Eye protection not required, but recommended.	Protective clothing is not required.	Respiratory protection may be needed for frequent or heavy exposure.
Carbon Dioxide	For the gas: Eye protection not required, but recommended. For the liquid: Wear splash resistant safety goggles. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.	For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing.	Any appropriate escape-type, self-contained breathing apparatus.
Nitrogen	Eye protection not required, but recommended.	Protective clothing is not required.	Respiratory protection may be needed for frequent or heavy exposure.

General Hygiene considerations

- Avoid breathing vapor or mist
- Avoid contact with eyes and skin
- Wash thoroughly after handling and before eating or drinking

Section 9: Physical and Chemical Properties

	Physical State	Appearance	Color	Change in Appearance	Physical Form	Odor	Taste
Hydrogen Sulfide	Gas	Colorless	Colorless	N/A	Gas	Rotten egg odor	N/A
Carbon Monoxide	Gas	Colorless	Colorless	N/A	Gas	Odorless	Tasteless
Methane	Gas	Colorless	Colorless	N/A	Gas	Odorless	Tasteless
Oxygen	Gas	Clear	Colorless	N/A	Gas	Odorless	Tasteless
Carbon Dioxide	Gas	Colorless	Colorless	N/A	Gas	Odorless	Acid taste
Nitrogen	Gas	Clear	Colorless	N/A	Gas	Odorless	Tasteless

	Flash Point	Flammability	Partition Coefficient	Autoignition Temperature	Upper Explosive Limits	Lower Explosive Limits

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	Flash Point	Flammability	Partition Coefficient	Autoignition Temperature	Upper Explosive Limits	Lower Explosive Limits
Hydrogen Sulfide	Flammable	Not available	Not available	500 F (260 C)	45.5%	3.9%
Carbon Monoxide	Flammable	Not available	1479.11 (log = 3.17) (estimated from water solubility)	1128-1202 F (609-650 C)	0.74	12.0-12.5%
Methane	-369 F (-223 C)	Not available	724.44 (log = 2.87) (estimated from water solubility)	999 F (537 C)	15%	5%
Oxygen	Not flammable	Not available	Not available	Nonflammable	Nonflammable	Nonflammable
Carbon Dioxide	Not flammable	Not available	N/A	Nonflammable	Nonflammable	Nonflammable
Nitrogen	Not flammable	Not available	Not available	Nonflammable	Nonflammable	Nonflammable

	Boiling Point	Freezing Point	Vapor Pressure	Vapor Density	Specific Gravity	Water Solubility	pH	Odor Threshold	Evaporation Rate	Viscosity
Hydrogen Sulfide	-78 to -77 F (-61 to -60.3 C)	-123 F (-86 C)	15200 mmHg @ 25 C	1.2 (Air=1)	1.192	2.58-2.9% @ 20 C	4.5-<7 (saturated solution)	0.13 ppm	Not applicable	0.0128 cP @ 25 C
Carbon Monoxide	-312.7 F (-191.5 C)	-326 F (-199 C)	760 mmHg @ -191 C gas; cannot be liquefied at room temperature	0.968 (Air=1)	Not applicable	2.3% @ 20 C	Not applicable	Not available	Not applicable	0.01657 cP @ 0 C
Methane	-260 F (-162 C)	-297 F (-183 C)	760 mmHg @ -161 C	0.555 (Air=1)	Not applicable	3.5% @ 17 C	Not applicable	Not available	Not applicable	0.01118 cP @ 27 C
Oxygen	-297 F (-183 C)	-360 F (-218 C)	760 mmHg @ -183 C	1.1 (Air=1)	Not applicable	3.2% @ 25 C	Not applicable	Not available	Not applicable	0.02075 cP @ 25 C
Carbon Dioxide	Not available	-71 F (-57 C) @ 4000 mmHg	43700 mmHg @ 21 C	1.5 (Air=1)	1.522 @ 21 C	Soluble	3.7 (saturated aqueous solution) @ 101.3 kPa (carbonic acid)	Not available	Not applicable	0.01657 cP @ 0 C
Nitrogen	-321 F (-196 C)	-346 F (-210 C)	760 mmHg @ -196 C	0.967 (Air=1)	Not applicable	1.6% @ 20 C	Not applicable	Not available	Not applicable	0.01787 cP @ 27 C

	Molecular Weight	Molecular Formula	Density	Weight per Gallon	Volatility by Volume	Volatility	Solvent Solubility
Hydrogen Sulfide	34.08	H2-S	1.539 g/L @ 0 C	Not available	Not available	Not applicable	Soluble: Carbon disulfide, alcohol, ether, glycerol, gasolines, kerosene, crude oil, alkali solutions
Carbon Monoxide	28.01	C-O	1.250 g/L @ 0 C	Not available	100%	Not applicable	Soluble: Alcohol, benzene, acetic acid, ethyl acetate, chloroform, cuprous chloride solutions
Methane	16.04	C-H4	0.717 g/L @ 0 C	Not available	Not applicable	Not applicable	Soluble: Alcohol, ether, benzene, organic solvents
Oxygen	31.9988	O2	1.309 g/L @ 25 C	Not available	Not applicable	Not applicable	Soluble: Alcohol
Carbon Dioxide	44.01	C-O2	0.114	Not available	Not applicable	Not applicable	Soluble: Alcohol, acetone, hydrocarbons, organic solvents
Nitrogen	28.0134	N2	1.2506 g/L	Not available	100%	1	Soluble: Liquid ammonia

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Section 10: Stability and Reactivity

	Stability	Conditions to Avoid	Incompatible Materials
Hydrogen Sulfide	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Combustible materials, metals, oxidizing materials, halogens, metal oxides, metal salts, bases, rust, oxidants, oxygen, copper powder, acetaldehyde, silver fulminate
Carbon Monoxide	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Oxidizing materials, halogens, metal oxides, metals, combustible materials, lithium
Methane	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Halogens, oxidizing materials, combustible materials
Oxygen	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Combustible materials, halo carbons, metals, bases, reducing agents, amines, metal salts, oxidizing materials, alkaline earth and alkali metals
Carbon Dioxide	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Combustible materials, oxidizing materials, metal salts, reducing agents, metal carbide, metals, bases
Nitrogen	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Metals, oxidizing materials

	Hazardous Decomposition Products	Possibility of Hazardous Reactions
Hydrogen Sulfide	Oxides of sulfur	Will not polymerize.
Carbon Monoxide	Oxides of carbon	Will not polymerize.
Methane	Oxides of carbon	Will not polymerize.
Oxygen	Miscellaneous decomposition products	Will not polymerize.
Carbon Dioxide	Carbon monoxide	Will not polymerize.
Nitrogen	Oxides of nitrogen	Will not polymerize.

Section 11: Toxicology Information

Acute Effects

	Oral LD50	Dermal LD50	Inhalation
Hydrogen Sulfide	444 ppm inhalation-rat LC50	Irritation 0.000125 ppm/5 hour(s) eyes-human	Irritation, lack of sense of smell, sensitivity to light, nausea, vomiting, difficulty breathing, headache, drowsiness, dizziness, disorientation, tremors, visual disturbances, suffocation, lung congestion, internal bleeding, heart damage, nerve damage, brain damage, coma, death
Carbon Monoxide	LC50 Inhalation Gas. Rat 1807 ppm 4 hours	Not available	Changes in body temperature, changes in blood pressure, nausea, vomiting, chest pain, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, disorientation, hallucinations, pain in extremities, tremors, loss of coordination, hearing loss, visual disturbances, eye damage, suffocation, blood disorders, convulsions, coma
Methane	Not available	Not available	Nausea, vomiting, difficulty breathing, irregular heartbeat, headache, drowsiness, fatigue, dizziness, disorientation, mood swings, tingling sensation, loss of coordination, suffocation, convulsions, unconsciousness, coma
Oxygen	Not established	Not established	Irritation, changes in body temperature, nausea, difficulty breathing, irregular heartbeat, dizziness, disorientation, hallucinations, mood swings, pain in extremities, tremors, lung congestion, convulsions
Carbon Dioxide	Not established	Not established	Ringing in the ears, nausea, irregular heartbeat, headache, drowsiness, dizziness, tingling sensation, visual disturbances, suffocation, convulsions, coma
Nitrogen	Not available	Not available	Nausea, vomiting, difficulty breathing, headache, drowsiness, dizziness, tingling sensation, loss of coordination, convulsions, coma

	Eye Irritation	Skin Irritation	Sensitization
Hydrogen Sulfide	Irritation, sensitivity to light, visual disturbances	Irritation liquid: frostbite	Acute toxicity, Category 2, inhalation; H330: Fatal if inhaled. Specific Target Organ Toxicity (single exposure), Category 3; H335: May cause respiratory irritation. Hazardous to the aquatic environment, Acute Category 1; H400: Very toxic to aquatic life
Carbon Monoxide	No information on significant adverse effects	No information on significant adverse effects	Acute toxicity, Category 3, inhalation; H331: Toxic if inhaled. Reproductive toxicity, Category 1A; H360D: May damage the unborn child. Specific Target Organ Toxicity (repeated exposure), Category 1; H372: Causes damage to organs through prolonged or repeated exposure.

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	Eye Irritation	Skin Irritation	Sensitization
Methane	No information on significant adverse effects	No information on significant adverse effects	Difficulty breathing
Oxygen	No information on significant adverse effects	No information on significant adverse effects	No significant target effects reported.
Carbon Dioxide	Irritation, frostbite, blurred vision	Liquid: blisters, frostbite	Difficulty breathing
Nitrogen	Contact with rapidly expanding gas may cause burns or frostbite	No information on significant adverse effects	Difficulty breathing

Chronic Effects

	Carcinogenicity	Mutagenicity	Reproductive Effects	Developmental Effects
Hydrogen Sulfide	Not available	Not available	Available.	No data
Carbon Monoxide	Not available	Available.	Available.	No data
Methane	Not available	Not available	Not available	No data
Oxygen	Not known.	Available.	Available.	No data
Carbon Dioxide	Not available	Not established	Available.	No data
Nitrogen	Not hazardous	Not available	Not available	No data

Section 12: Ecological Information

Fate and Transport

	Eco toxicity	Persistence / Degradability	Bioaccumulation / Accumulation	Mobility in Environment
Hydrogen Sulfide	Fish toxicity: Acute LC50 7 ug/L Fresh water Fish - Fathead minnow - Pimephales promelas - FRY 96 hours; 14.9 ug/L 96 hour(s) LC50 (Mortality) Fathead minnow (Pimeph Invertibrate toxicity: 9730 ug/L 1.5 hour(s) (Mortality) Mediterranean mussel (Mytilus galloprovincialis) Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Highly toxic to aquatic life.	Not available	Not available
Carbon Monoxide	Fish toxicity: 75000 ug/L 1 day(s) LC100 (Mortality) Orangespotted sunfish (Lepomis humilis) Invertibrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Relatively non-persistent in the environment. Highly volatile from water.	Not available	Not expected to leach through the soil or the sediment.
Methane	Fish toxicity: Not available Invertibrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Relatively non-persistent in the environment. Moderately volatile from water.	Accumulates very little in the bodies of living organisms.	Not expected to leach through the soil or the sediment.
Oxygen	Fish toxicity: Not available Invertibrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Not available	Low bioaccumulation	Not available
Carbon Dioxide	Fish toxicity: 150000 ug/L 48 day(s) (Mortality) Brown trout (Salmo trutta) Invertibrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Relatively non-persistent in the environment. Moderately volatile from water.	Accumulates very little in the bodies of living organisms.	Leaches through the soil
Nitrogen	Fish toxicity: Not available Invertibrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Not available	Not available	Not available

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Section 13: Disposal Considerations

Hydrogen Sulfide	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U135.
Carbon Monoxide	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.
Methane	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.
Oxygen	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.
Carbon Dioxide	Dispose in accordance with all applicable regulations.
Nitrogen	Dispose in accordance with all applicable regulations.

Section 14: Transportation Information

U.S. DOT 49 CFR 172.101

DOT Information For This Mixture

Shipping Name	Compressed gas, n.o.s. (Nitrogen, Oxygen)
UN Number	UN1956
Hazard Class	2.2
Hazard Information	Non-Flammable Gas

Individual Component Information

	Proper Shipping Name	ID Number	Hazard Class or Division	Packing Group	Labeling Requirements	Passenger Aircraft or Railcar Quantity Limitations	Cargo Aircraft Only Quantity Limitations	Additional Shipping Description
Hydrogen Sulfide	Hydrogen sulfide	UN1053	2.3	Not applicable	2.3; 2.1	Forbidden	Forbidden	Toxic-Inhalation Hazard Zone B
Carbon Monoxide	Carbon monoxide, compressed	UN1016	2.3	Not applicable	2.3; 2.1	Forbidden	25 kg	Toxic-Inhalation Hazard Zone D
Methane	Methane, compressed	UN1971	2.1	Not applicable	2.1	Forbidden	150 kg	N/A
Oxygen	Oxygen, compressed	UN1072	2.2	Not available	2.2; 5.1	75 kg or L	150 kg	N/A
Carbon Dioxide	Carbon dioxide	UN1013	2.2	Not applicable	2.2	75 kg or L	150kg	None
Nitrogen	Nitrogen, compressed	UN1066	2.2	Not applicable	2.2	75 kg or L	150 kg	N/A

Canadian Transportation of Dangerous Goods

	Shipping Name	UN Number	Class	Packing Group / Risk Group
Hydrogen Sulfide	HYDROGEN SULFIDE; or HYDROGEN SULPHIDE	UN1053	2.3; 2.1	Not applicable
Carbon Monoxide	Carbon monoxide, compressed	UN1016	2.3; 2.1	Not applicable
Methane	Methane, compressed	UN1971	2.1	Not applicable
Oxygen	Oxygen, compressed	UN1072	2.2; 5.1	Not applicable
Carbon Dioxide	Carbon dioxide	UN1013	2.2	Not applicable
Nitrogen	Nitrogen, compressed	UN1066	2.2	Not applicable

Section 15: Regulatory Information

U.S. Regulations

	CERCLA Sections	SARA 355.30	SARA 355.40

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Hydrogen Sulfide	100 LBS RQ	500 LBS TPQ	100 LBS RQ
Carbon Monoxide	Not regulated.	Not regulated.	Not regulated.
Methane	Not regulated.	Not regulated.	Not regulated.
Oxygen	Not regulated.	Not regulated.	Not regulated.
Carbon Dioxide	Not regulated.	Not regulated.	Not regulated.
Nitrogen	Not regulated.	Not regulated.	Not regulated.

SARA 370.21

	Acute	Chronic	Fire	Reactive	Sudden Release
Hydrogen Sulfide	Yes	No	Yes	No	Yes
Carbon Monoxide	Yes	No	Yes	No	Yes
Methane	Yes	No	Yes	No	Yes
Oxygen	No	No	Yes	No	Yes
Carbon Dioxide	Yes	No	No	No	Yes
Nitrogen	Yes	No	No	No	Yes

SARA 372.65

Hydrogen Sulfide	HYDROGEN SULFIDE: Administrative stay issued Aug. 22, 1994
Carbon Monoxide	Not regulated.
Methane	Not regulated.
Oxygen	Not regulated.
Carbon Dioxide	Not regulated.
Nitrogen	Not regulated.

OSHA Process Safety

Hydrogen Sulfide	1500 LBS TQ
Carbon Monoxide	Not regulated.
Methane	Not regulated.
Oxygen	Not regulated.
Carbon Dioxide	Not regulated.
Nitrogen	Not regulated.

State Regulations

	CA Proposition 65
Hydrogen Sulfide	Not regulated.
Carbon Monoxide	WARNING: This product can expose you to chemicals including Carbon Monoxide, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.
Methane	Not regulated.
Oxygen	Not regulated.
Carbon Dioxide	Not regulated.
Nitrogen	Not regulated.

Canadian Regulations

	WHMIS Classification
Hydrogen Sulfide	A, B1, D1A, D2B.
Carbon Monoxide	A, B1, D1A, D2A.
Methane	A, B1
Oxygen	A,C
Carbon Dioxide	A
Nitrogen	A

National Inventory Status

	US Inventory (TSCA)	TSCA 12b Export Notification	Canada Inventory (DSL/NDSL)
Hydrogen Sulfide	Listed on inventory.	Not listed.	Listed on inventory.
Carbon Monoxide	Listed on inventory.	Not listed.	Listed on inventory.
Methane	Listed on inventory.	Not listed.	Listed on inventory.
Oxygen	Listed on inventory.	Not listed.	Not determined.
Carbon Dioxide	Listed on inventory.	Not listed.	Listed on inventory.
Nitrogen	Listed on inventory.	Not listed.	Listed on inventory.

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Section 16: Other Information

	NFPA Rating
Hydrogen Sulfide	HEALTH=4 FIRE=4 REACTIVITY=0
Carbon Monoxide	HEALTH=2 FIRE=4 REACTIVITY=0
Methane	HEALTH=0 FIRE=4 REACTIVITY=0
Oxygen	HEALTH=0 FIRE=0 REACTIVITY=0 SPECIAL=OX
Carbon Dioxide	HEALTH=3 FIRE=0 REACTIVITY=0 SPECIAL=SA
Nitrogen	HEALTH=0 FIRE=0 REACTIVITY=0 SPECIAL=SA

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard

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SAFETY DATA SHEET

Creation Date 30-Oct-2009 **Revision Date** 24-Dec-2021 **Revision Number** 4

1. Identification

Product Name **Potassium hydrogen phthalate**

Cat No. : **AC177120000; AC177120025; AC177120050; AC177121000; AC177125000**

CAS No 877-24-7
Synonyms Potassium acid phthalate; Potassium biphthalate

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
Classification under 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

This chemical is not considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Label Elements
None required

Hazards not otherwise classified (HNOC)
None identified

3. Composition/Information on Ingredients

Component	CAS No	Weight %
1,2-Benzenedicarboxylic acid, monopotassium salt	877-24-7	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention if irritation persists.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Get medical attention immediately if symptoms occur.

Inhalation Remove to fresh air. Get medical attention immediately if symptoms occur. If not breathing, give artificial respiration.

Ingestion Do NOT induce vomiting. Get medical attention.

Most important symptoms and effects No information available.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition. Thermal decomposition can lead to release of irritating gases and vapors.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2).
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
1	1	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment as required. Avoid dust formation.

Environmental Precautions Should not be released into the environment. See Section 12 for additional Ecological Information.

Methods for Containment and Clean Up Sweep up and shovel into suitable containers for disposal. Avoid dust formation.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Ensure adequate ventilation. Avoid contact with skin, eyes or clothing. Avoid ingestion and inhalation. Avoid dust formation.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Incompatible Materials. Strong oxidizing agents.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.

Engineering Measures None under normal use conditions.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection No protective equipment is needed under normal use conditions.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	White
Odor	Odorless
Odor Threshold	No information available
pH	3.8-4.0 5% aq.sol
Melting Point/Range	295 - 300 °C / 563 - 572 °F
Boiling Point/Range	No information available
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	Not applicable
Specific Gravity	No information available
Solubility	Slightly soluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	C8 H5 K O4
Molecular Weight	204.22

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Avoid dust formation.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
1,2-Benzenedicarboxylic acid, monopotassium salt	LD50 > 3200 mg/kg (Rat)	>1000 mg/kg	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
1,2-Benzenedicarboxylic acid, monopotassium salt	877-24-7	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains.

Persistence and Degradability Soluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its water solubility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT Not regulated
TDG Not regulated
IATA Not regulated
IMDG/IMO Not regulated

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
1,2-Benzenedicarboxylic acid, monopotassium salt	877-24-7	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
1,2-Benzenedicarboxylic acid, monopotassium salt	877-24-7	X	-	212-889-4	X	X	X	X	X	KE-02310

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313 Not applicable

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations Not applicable

U.S. Department of Transportation
Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
1,2-Benzenedicarboxylic acid, monopotassium salt	877-24-7	Not applicable	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
1,2-Benzenedicarboxylic acid, monopotassium salt	877-24-7	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 30-Oct-2009
Revision Date 24-Dec-2021
Print Date 24-Dec-2021
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

HORIBA

SAFETY DATA SHEET

Section 1. Product and Company Identification

Product Name: 525-4, 500-4, 560-4 (pH 4.01 buffer solution)

Product code: 3999960018, 3999960029, 3999960146

Recommended use: For laboratory and Industrial use

Manufacturer / Supplier: Horiba Instruments (Singapore) Pte Ltd
83 Science Park Drive, #02-02A, The Curie
Singapore-118258
Contact No: +65 69089600

Section 2. Hazard identification

Classification of the Substance or Mixture: Mixture

The mixture is classified as not hazardous according to regulation (EC) 1272/2008, Globally Harmonized System (GHS)

GHS Label elements:

Signal word: No Signal word
Hazard statement: No Known significant effects or critical hazards

Precautionary statements:
General: Do not handle until all safety precautions have been read and understood

Other hazards which do not result in classification: None known

Section 3. Composition/ information on ingredients

Substance or Mixture: Mixture

CAS Numbers other identifiers:

Ingredients	CAS Number	Percentage
Potassium Hydrogen Phthalate	877-24-7	<2%
Water	7732-18-5	>98%

This product contains <0.01% other ingredient, not required to be listed as it is not hazardous to health and environment.

The exact percentage of composition has been withheld as a trade secret

Chemical formula: Not applicable

Section 4. First Aid Measures

Description of necessary first aid measures

Eye contact:	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Remove any contact lenses. Get medical attention if irritation occurs.
Inhalation:	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur.
Skin contact:	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur.
Ingestion:	Clean mouth with water. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur.

Most important symptoms/effects, both acute and delayed

Potential acute health effects: No known significant effects or critical hazards

Over-exposure signs/symptoms: No specific data available

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician: Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

See toxicological information (Section 11)

Section 5. Firefighting Measures

Extinguishing Media

Suitable extinguishing media: Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing Media: No Information available

Specific hazards arising from the substance or mixture: No specific information available

Hazardous thermal decomposition products: No Specific data

Special protective actions for Fire-fighters: Promptly isolate the scene by removing all persons from the incident if there is fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus with a full face-piece operated in positive pressure mode.

Section 6. Accidental release Measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel: No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material

For emergency responders: If specialized clothing is required to deal with the spillage, take note of any information in section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel"

Environmental precautions: Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, water ways, soil and air

Methods and material for containment and cleaning up:

Method for Containment: Prevent further leakage or spillage if safe to do so.

Methods of cleaning up: Soak up with inert absorbent material. Pick up and transfer to properly labelled containers.

Section 7. Handling and storage

Precautions for safe handling

Protective measures: Put on appropriate personal protective equipment (see Section 8).

Advice on general occupational hygiene: Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas.

Conditions for safe storage, including any incompatibilities: Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits: None

Appropriate engineering controls: Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection:	Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Body protection:	Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Other skin protection:	Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Respiratory protection:	Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance	
Physical state:	Liquid
Colour:	Colourless
Odour:	Odourless
Odour Threshold:	Not available
pH:	4.01
Melting Point:	Not available
Boiling Point:	100° C
Flash point:	[Product does not sustain combustion.]
Evaporation rate:	Not available
Flammability (solid, gas):	Not available
Lower and upper explosive (Flammable) limits:	Not available
Vapour pressure:	Not available
Vapour density:	Not available
Relative density:	Not available
Partition coefficient n- octanol/water:	Not available
Auto-ignition temperature:	Not available
Decomposition temperature:	Not available
Viscosity:	Not available

Section 10. Stability and reactivity

Reactivity:	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability:	The product is stable
Possibility of hazardous reactions:	Hazardous reactions or instability may occur under certain conditions of storage or use.
Conditions to avoid:	No specific data
Incompatible materials:	No specific data
Hazardous decomposition Products:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological Information

Information on toxicological effects

Acute toxicity:	Not available
Irritation/Corrosion:	Not available
Sensitization:	Not available
Mutagenicity:	Not available
Carcinogenicity:	Not available
Reproductive toxicity:	Not available
Teratogenicity:	Not available
Specific target organ toxicity (single exposure):	Not available
Specific target organ toxicity (repeated exposure):	Not available
Aspiration hazard:	Not available
Information on the likely routes of exposure:	Not available

Potential acute effects:

Eye contact:	No known significant effects or critical hazards
Inhalation:	No known significant effects or critical hazards
Skin contact:	No known significant effects or critical hazards
Ingestion:	No known significant effects or critical hazards

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact:	No specific data
Inhalation:	No specific data
Skin contact:	No specific data
Ingestion:	No specific data

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects:	Not available
Potential delayed effects:	Not available

Long term exposure

Potential immediate effects	Not available
Potential delayed effects:	Not available

Potential chronic health effects:	Not available
General:	No known significant effects or critical hazards
Carcinogenicity:	No known significant effects or critical hazards
Mutagenicity:	No known significant effects or critical hazards
Teratogenicity:	No known significant effects or critical hazards
Developmental effects:	No known significant effects or critical hazards
Fertility effects:	No known significant effects or critical hazards

Numerical measures of toxicity

Acute toxicity estimates:	Not available

Section 12. Ecological information

Toxicity:	Not available
Persistence/degradability:	Not available

Bio accumulative potential: Not available

Mobility in soil
Soil/water
partition coefficient (K_{OC}): Not available

Other adverse effects: No known significant effects or critical hazards.

Section 13. Disposal consideration

Disposal methods: The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non- recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	UN	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-
Transport hazard class(es)	-	-	-
Packing group	-	-	-
Environmental hazards	No.	No.	No.
Additional information	-	-	-

Special precautions for user: Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 15. Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture.
International Inventories:
USINV Complies

CANINV	Complies
EINECS/ELINCS	Complies
ENCS	Complies
IECSC	Complies
KECL	Complies
PICCS	Complies
AICS	Complies

Key of abbreviation:
USINV / TSCA: United States Toxic Substanc3es Control Act Section 8(b) Inventory
CANINV / DSL/NDSL: Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS: European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
ENCS: Japanese Existing and New Chemical Substances
IECSC: Chinese Inventory of Existing Chemical Substances
KECL: Korean Existing and Evaluated Chemical Substances
PICCS: Philippines Inventory of Chemical and Chemical Substances
AICS: Australian Inventory of Chemical Substances

Chemical safety assessment:
A chemical safety assessment according to regulation (EC) No: 1907/2006 is not required.

Section 16. Other information

History:

Date of issue: 6 March 2018

Key of abbreviation:
ATE: Acute Toxicity Estimate
BCF: Bioconcentration Factor
GHS: Globally harmonized System of classification and labelling of chemicals
IATA: International Air Transport Association
IBC= Intermediate Bulk Container
IMDG International maritime Dangerous goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Notice to reader:

To the best of our knowledge, the information contained herein is accurate. However, neither the above- named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

HORIBA

SAFETY DATA SHEET

Section 1. Product and Company Identification

Product Name: 525-7, 500-7, 560-7 (pH 7 buffer solution)

Product code: 3999960020, 3999960031, 3999960147

Recommended use: For laboratory and Industrial use

Manufacturer / Supplier: Horiba Instruments (Singapore) Pte Ltd
83 Science Park Drive, #02-02A, The Curie
Singapore-118258
Contact No: +65 69089600

Section 2. Hazard identification

Classification of the Substance or Mixture: Mixture

The mixture is classified as not hazardous according to regulation (EC) 1272/2008, Globally Harmonized System (GHS)

GHS Label elements:

Signal word: No Signal word
Hazard statement: No Known significant effects or critical hazards

Precautionary statements:
General: Do not handle until all safety precautions have been read and understood

Other hazards which do not result in classification: None known

Section 3. Composition/ information on ingredients

Substance or Mixture: Mixture

CAS Numbers other identifiers:

Ingredients	CAS Number	Percentage
Potassium Dihydrogen Phosphate	7778-77-0	<1%
Disodium Hydrogen Phosphate	7558-79-4	<1%
Water	7732-18-5	>98%

This product contains <0.01% other ingredient, not required to be listed as it is not hazardous to health and environment.

The exact percentage of composition has been withheld as a trade secret

Chemical formula: Not applicable

Section 4. First Aid Measures

Description of necessary first aid measures

Eye contact:	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Remove any contact lenses. Get medical attention if irritation occurs.
Inhalation:	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur.
Skin contact:	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur.
Ingestion	Clean mouth with water. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur.

Most important symptoms/effects, both acute and delayed

Potential acute health effects: No known significant effects or critical hazards

Over-exposure signs/symptoms: No specific data available

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician: Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

See toxicological information (Section 11)

Section 5. Firefighting Measures

Extinguishing Media

Suitable extinguishing media: Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing Media: No Information available

Specific hazards arising from the substance or mixture: No specific information available

Hazardous thermal decomposition products: No Specific data

Special protective actions for Fire-fighters: Promptly isolate the scene by removing all persons from the incident if there is fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus with a full face-piece operated in positive pressure mode.

Section 6. Accidental release Measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel: No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material

For emergency responders: If specialized clothing is required to deal with the spillage, take note of any information in section 8 on suitable and unsuitable materials. See also the information in “For non-emergency personnel”

Environmental precautions: Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, water ways, soil and air

Methods and material for containment and cleaning up:

Method for Containment: Prevent further leakage or spillage if safe to do so.

Methods of cleaning up: Soak up with inert absorbent material. Pick up and transfer to properly labelled containers.

Section 7. Handling and storage

Precautions for safe handling
Protective measures: Put on appropriate personal protective equipment (see Section 8).

Advice on general occupational hygiene: Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas.

Conditions for safe storage, including any incompatibilities: Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits: None

Appropriate engineering controls: Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures
Hygiene measures: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection:	Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Body protection:	Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Other skin protection:	Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Respiratory protection:	Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance	
Physical state:	Liquid
Colour:	Colourless
Odour:	Odourless
Odour Threshold:	Not available
pH:	6.86
Melting Point:	Not available
Boiling Point:	100° C
Flash point:	[Product does not sustain combustion.]
Evaporation rate:	Not available
Flammability (solid, gas):	Not available
Lower and upper explosive (Flammable) limits:	Not available
Vapour pressure:	Not available
Vapour density:	Not available
Relative density:	Not available
Partition coefficient n- octanol/water:	Not available
Auto-ignition temperature:	Not available
Decomposition temperature:	Not available
Viscosity:	Not available

Section 10. Stability and reactivity

Reactivity:	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability:	The product is stable
Possibility of hazardous reactions:	Hazardous reactions or instability may occur under certain conditions of storage or use.
Conditions to avoid:	No specific data
Incompatible materials:	No specific data
Hazardous decomposition Products:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological Information

Information on toxicological effects

Acute toxicity:	Not available
Irritation/Corrosion:	Not available
Sensitization:	Not available
Mutagenicity:	Not available
Carcinogenicity:	Not available
Reproductive toxicity:	Not available
Teratogenicity:	Not available
Specific target organ toxicity (single exposure):	Not available
Specific target organ toxicity (repeated exposure):	Not available
Aspiration hazard:	Not available
Information on the likely routes of exposure:	Not available

Potential acute effects:

Eye contact:	No known significant effects or critical hazards
Inhalation:	No known significant effects or critical hazards
Skin contact:	No known significant effects or critical hazards
Ingestion:	No known significant effects or critical hazards

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact:	No specific data
Inhalation:	No specific data
Skin contact:	No specific data
Ingestion:	No specific data

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects:	Not available
Potential delayed effects:	Not available

Long term exposure

Potential immediate effects:	Not available
Potential delayed effects:	Not available

Potential chronic health effects: Not available

General:	No known significant effects or critical hazards
Carcinogenicity:	No known significant effects or critical hazards
Mutagenicity:	No known significant effects or critical hazards
Teratogenicity:	No known significant effects or critical hazards
Developmental effects:	No known significant effects or critical hazards
Fertility effects:	No known significant effects or critical hazards

Numerical measures of toxicity

Acute toxicity estimates: Not available

Section 12. Ecological information

Toxicity: Not available

Persistence/degradability: Not available

Bio accumulative potential: Not available

Mobility in soil

Soil/water partition coefficient (K_{OC}): Not available

Other adverse effects: No known significant effects or critical hazards.

Section 13. Disposal consideration

Disposal methods: The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non- recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	UN	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-
Transport hazard class(es)	-	-	-
Packing group	-	-	-
Environmental hazards	No.	No.	No.
Additional information	-	-	-

Special precautions for user: Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 15. Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture.

International Inventories:

USINV	Complies
CANINV	Complies
EINECS/ELINCS	Complies
ENCS	Complies

IECSC	Complies
KECL	Complies
PICCS	Complies
AICS	Complies

Key of abbreviation:
USINV / TSCA: United States Toxic Substanc3es Control Act Section 8(b) Inventory
CANINV / DSL/NDSL: Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS: European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
ENCS: Japanese Existing and New Chemical Substances
IECSC: Chinese Inventory of Existing Chemical Substances
KECL: Korean Existing and Evaluated Chemical Substances
PICCS: Philippines Inventory of Chemical and Chemical Substances
AICS: Australian Inventory of Chemical Substances

Chemical safety assessment:
A chemical safety assessment according to regulation (EC) No: 1907/2006 is not required.

Section 16. Other information

History:

Date of issue: 28 Feb 2018

Key of abbreviation:
ATE: Acute Toxicity Estimate
BCF: Bioconcentration Factor
GHS: Globally harmonized System of classification and labelling of chemicals
IATA: International Air Transport Association
IBC= Intermediate Bulk Container
IMDG International maritime Dangerous goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Notice to reader:

To the best of our knowledge, the information contained herein is accurate. However, neither the above- named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

HORIBA

SAFETY DATA SHEET

Section 1. Product and Company Identification

Product Name: 525-10, 500-10, 560-10 (pH 10.01 buffer solution)

Product code: 3999960022, 3999960033, 3999960138

Recommended use: For laboratory and Industrial use

Manufacturer / Supplier: Horiba Instruments (Singapore) Pte Ltd
83 Science Park Drive, #02-02A, The Curie
Singapore-118258
Contact No: +65 69089600

Section 2. Hazard identification

Classification of the Substance or Mixture: Mixture

The mixture is classified as not hazardous according to regulation (EC) 1272/2008, Globally Harmonized System (GHS)

GHS Label elements:

Signal word: No Signal word
Hazard statement: No Known significant effects or critical hazards

Precautionary statements:
General: Do not handle until all safety precautions have been read and understood

Other hazards which do not result in classification: None known

Section 3. Composition/ information on ingredients

Substance or Mixture: Mixture

CAS Numbers other identifiers:

Ingredients	CAS Number	Percentage
Sodium Carbonate	497-19-8	<1%
Sodium Bicarbonate	144-55-8	<1%
Water	7732-18-5	>98%

This product contains <0.01% other ingredient, not required to be listed as it is not hazardous to health and environment.

The exact percentage of composition has been withheld as a trade secret

Chemical formula: Not applicable

Section 4. First Aid Measures

Description of necessary first aid measures

Eye contact:	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Remove any contact lenses. Get medical attention if irritation occurs.
Inhalation:	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur.
Skin contact:	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur.
Ingestion	Clean mouth with water. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur.

Most important symptoms/effects, both acute and delayed

Potential acute health effects: No known significant effects or critical hazards

Over-exposure signs/symptoms: No specific data available

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician: Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

See toxicological information (Section 11)

Section 5. Firefighting Measures

Extinguishing Media

Suitable extinguishing media: Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing Media: No Information available

Specific hazards arising from the substance or mixture: No specific information available

Hazardous thermal decomposition products: No Specific data

Special protective actions for Fire-fighters: Promptly isolate the scene by removing all persons from the incident if there is fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus with a full face-piece operated in positive pressure mode.

Section 6. Accidental release Measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel: No action shall be taken involving any personal risk or without suitable training. Evacuate

surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material

For emergency responders: If specialized clothing is required to deal with the spillage, take note of any information in section 8 on suitable and unsuitable materials. See also the information in “For non-emergency personnel”

Environmental precautions: Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, water ways, soil and air

Methods and material for containment and cleaning up:

Method for Containment: Prevent further leakage or spillage if safe to do so.

Methods of cleaning up: Soak up with inert absorbent material. Pick up and transfer to properly labelled containers.

Section 7. Handling and storage

Precautions for safe handling
Protective measures: Put on appropriate personal protective equipment (see Section 8).

Advice on general occupational hygiene: Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas.

Conditions for safe storage, including any incompatibilities: Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits: None

Appropriate engineering controls: Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures
Hygiene measures: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with

side-shields.

Skin protection

Hand protection:	Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Body protection:	Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Other skin protection:	Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Respiratory protection:	Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance

Physical state:	Liquid
Colour:	Colourless
Odour:	Odourless
Odour Threshold:	Not available
pH:	10.01
Melting Point:	Not available
Boiling Point:	100° C
Flash point:	[Product does not sustain combustion.]
Evaporation rate:	Not available
Flammability (solid, gas):	Not available
Lower and upper explosive (Flammable) limits:	Not available
Vapour pressure:	Not available
Vapour density:	Not available
Relative density:	Not available
Partition coefficient n- octanol/water:	Not available
Auto-ignition temperature:	Not available
Decomposition temperature:	Not available
Viscosity:	Not available

Section 10. Stability and reactivity

Reactivity:	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability:	The product is stable
Possibility of hazardous reactions:	Hazardous reactions or instability may occur under certain conditions of storage or use.
Conditions to avoid:	No specific data
Incompatible materials:	No specific data
Hazardous decomposition	

Products:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological Information

Information on toxicological effects

Acute toxicity:	Not available
Irritation/Corrosion:	Not available
Sensitization:	Not available
Mutagenicity:	Not available
Carcinogenicity:	Not available
Reproductive toxicity:	Not available
Teratogenicity:	Not available
Specific target organ: toxicity (single exposure):	Not available
Specific target organ toxicity (repeated exposure):	Not available
Aspiration hazard:	Not available
Information on the likely routes of exposure:	Not available

Potential acute effects:

Eye contact:	No known significant effects or critical hazards
Inhalation:	No known significant effects or critical hazards
Skin contact:	No known significant effects or critical hazards
Ingestion:	No known significant effects or critical hazards

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact:	No specific data.
Inhalation:	No specific data.
Skin contact:	No specific data.
Ingestion:	No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effect:	Not available
Potential delayed effects:	Not available

Long term exposure

Potential immediate effects:	Not available
Potential delayed effects:	Not available

Potential chronic health effects:	Not available
General:	No known significant effects or critical hazards
Carcinogenicity:	No known significant effects or critical hazards
Mutagenicity:	No known significant effects or critical hazards
Teratogenicity:	No known significant effects or critical hazards
Developmental effects:	No known significant effects or critical hazards
Fertility effects:	No known significant effects or critical hazards

Numerical measures of toxicity

Acute toxicity estimates:	Not available

Section 12. Ecological information

Toxicity:	Not available
Persistence/degradability:	Not available
Bio accumulative potential:	Not available

Mobility in soil
Soil/water partition coefficient (K_{OC}): Not available

Other adverse effects: No known significant effects or critical hazards.

Section 13. Disposal consideration

Disposal methods: The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non- recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	UN	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-
Transport hazard class(es)	-	-	-
Packing group	-	-	-
Environmental hazards	No.	No.	No.
Additional information	-	-	-

Special precautions for user: Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 15. Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture.
International Inventories:

USINV	Complies
CANINV	Complies
EINECS/ELINCS	Complies
ENCS	Complies

IECSC	Complies
KECL	Complies
PICCS	Complies
AICS	Complies

Key of abbreviation:
USINV / TSCA: United States Toxic Substanc3es Control Act Section 8(b) Inventory
CANINV / DSL/NDSL: Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS: European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
ENCS: Japanese Existing and New Chemical Substances
IECSC: Chinese Inventory of Existing Chemical Substances
KECL: Korean Existing and Evaluated Chemical Substances
PICCS: Philippines Inventory of Chemical and Chemical Substances
AICS: Australian Inventory of Chemical Substances

Chemical safety assessment:
A chemical safety assessment according to regulation (EC) No: 1907/2006 is not required.

Section 16. Other information

History:

Date of issue: 6 March 2018

Key of abbreviation:
ATE: Acute Toxicity Estimate
BCF: Bioconcentration Factor
GHS: Globally harmonized Syatem of classification and labelling of chemicals
IATA: International Air Transport Association
IBC= Intermediate Bulk Container
IMDG International maritime Dangerous goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Notice to reader:

To the best of our knowledge, the information contained herein is accurate. However, neither the above- named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

HORIBA

SAFETY DATA SHEET

Section 1. Product and Company Identification

Product Name: 525-3; 560-3 (internal filling solution for pH combination electrode)

Product code: 3999960023; 3999960139

Recommended use: For laboratory and Industrial use

Manufacturer / Supplier: Horiba Instruments (Singapore) Pte Ltd
83 Science Park Drive, #02-02A, The Curie
Singapore-118258
Contact No: +65 69089660

Section 2. Hazard identification

Classification of the Substance or Mixture: Mixture

The mixture is classified as not hazardous according to regulation (EC) 1272/2008, Globally Harmonized System (GHS)

GHS Label elements:

Signal word: No Signal word
Hazard statement: No Known significant effects or critical hazards

Precautionary statements:
General: Do not handle until all safety precautions have been read and understood

Other hazards which do not result in classification: None known

Section 3. Composition/ information on ingredients

Substance or Mixture: Mixture

CAS Numbers other identifiers:

Ingredients	CAS Number	Percentage
Potassium Chloride	7447-40-7	<25%
Water	7732-18-5	>75%

The exact percentage of composition has been withheld as a trade secret

Chemical formula: Not applicable

Section 4. First Aid Measures

Description of necessary first aid measures

Eye contact:	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Remove any contact lenses. Get medical attention if irritation occurs.
Inhalation:	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur.
Skin contact:	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur.
Ingestion:	Clean mouth with water. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur.

Most important symptoms/effects, both acute and delayed

Potential acute health effects:

Eye contact: Causes eye irritation

Over-exposure signs/symptoms: No specific data available

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician: Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

See toxicological information (Section 11)

Section 5. Firefighting Measures

Extinguishing Media

Suitable extinguishing media:	Use an extinguishing agent suitable for the surrounding fire.
Unsuitable extinguishing Media:	No Information available
Specific hazards arising from the substance or mixture:	No specific information available
Hazardous thermal decomposition products:	No Specific data
Special protective actions for Fire-fighters:	Promptly isolate the scene by removing all persons from the incident if there is fire. No action shall be taken involving any personal risk or without suitable training
Special protective equipment for fire-fighters	Fire-fighters should wear appropriate protective equipment self- contained breathing apparatus with a full face-piece operated in positive pressure mode.

Section 6. Accidental release Measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel:	No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material.
For emergency responders:	If specialized clothing is required to deal with the spillage, take note of any information

In section 8 on suitable and unsuitable materials. See also the information in “For non-emergency personnel”.

Environmental precautions: Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, water ways, soil and air.

Methods and material for containment and cleaning up:

Method for Containment: Prevent further leakage or spillage if safe to do so.

Methods of cleaning up: Soak up with inert absorbent material. Pick up and transfer to properly labelled containers.

Section 7. Handling and storage

Precautions for safe handling
Protective measures: Put on appropriate personal protective equipment (see Section 8).

Advice on general occupational hygiene: Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas.

Conditions for safe storage, including any incompatibilities: Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters
Occupational exposure limits: None

Appropriate engineering controls: Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process Equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures
Hygiene measures: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection
Hand protection: Chemical-resistant, impervious gloves complying with an approved standard should

	be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Body protection:	Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Other skin protection:	Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Respiratory protection:	Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance	
Physical state:	Liquid
Colour:	Colourless
Odour:	Odourless
Odour Threshold:	Not available
pH:	Not available
Melting Point:	Not available
Boiling Point:	100° C
Flash point:	[Product does not sustain combustion.]
Evaporation rate:	Not available
Flammability (solid, gas):	Not available
Lower and upper explosive: (Flammable) limits	Not available
Vapour pressure:	Not available
Vapour density:	Not available
Relative density:	Not available
Partition coefficient: n- octanol/water	Not available
Auto-ignition temperature:	Not available
Decomposition temperature:	Not available
Viscosity:	Not available

Section 10. Stability and reactivity

Reactivity:	No specific test data related to reactivity available for this product or its ingredients
Chemical stability:	The product is stable
Possibility of hazardous:	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid:	No specific data
Incompatible materials:	No specific data
Hazardous decomposition: Products	Under normal conditions of storage and use, hazardous decomposition products should be produced

Section 11. Toxicological Information

Information on toxicological effects

Acute toxicity:	Not available
Irritation/Corrosion:	Not available
Sensitization:	Not available
Mutagenicity:	Not available
Carcinogenicity:	Not available
Reproductive toxicity:	Not available
Teratogenicity:	Not available
Specific target organ toxicity (single exposure):	Not available
Specific target organ: toxicity (repeated exposure):	Not available
Aspiration hazard:	Not available
Information on the likely: routes of exposure	Not available

Potential acute health effects:

Eye contact:	Causes eye irritation
Inhalation:	No known significant effects or critical hazards
Skin contact:	No known significant effects or critical hazards
Ingestion:	No known significant effects or critical hazards

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact:	Adverse symptoms may include irritation, watering and redness
Inhalation:	No specific data
Skin contact:	No specific data
Ingestion:	No specific data

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate: effects	Not available
Potential delayed effects:	Not available

Long term exposure

Potential immediate: effects	Not available
Potential delayed effects:	Not available

Potential chronic health effects:	Not available
General:	No known significant effects or critical hazards
Carcinogenicity:	No known significant effects or critical hazards
Mutagenicity:	No known significant effects or critical hazards
Teratogenicity:	No known significant effects or critical hazards
Developmental effects:	No known significant effects or critical hazards
Fertility effects:	No known significant effects or critical hazards

Numerical measures of toxicity

Acute toxicity estimates:	Not available

Section 12. Ecological information

Toxicity: Not available

Persistence/degradability: Not available

Bio accumulative potential: Not available

Mobility in soil
Soil/water
partition coefficient (K_{OC}): Not available

Other adverse effects: No known significant effects or critical hazards.

Section 13. Disposal consideration

Disposal methods: The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non- recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	UN	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-
Transport hazard class(es)	-	-	-
Packing group	-	-	-
Environmental hazards	No.	No.	No.
Additional information	-	-	-

Special precautions for user: Transport within user's premises: always transport in closed containers that are ` upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 15. Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture.
International Inventories:

USINV	Complies
CANINV	Complies
EINECS/ELINCS	Complies
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IECSC	Complies
KECL	Complies
PICCS	Complies
AICS	Complies

Key of abbreviation:
USINV / TSCA: United States Toxic Substanc3es Control Act Section 8(b) Inventory
CANINV / DSL/NDSL: Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS: European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
ENCS: Japanese Existing and New Chemical Substances
IECSC: Chinese Inventory of Existing Chemical Substances
KECL: Korean Existing and Evaluated Chemical Substances
PICCS: Philippines Inventory of Chemical and Chemical Substances
AICS: Australian Inventory of Chemical Substances

Chemical safety assessment:
A chemical safety assessment according to regulation (EC) No: 1907/2006 is not required.

Section 16. Other information

History:

Date of issue: 8 March 2018

Key of abbreviation:

ATE: Acute Toxicity Estimate

BCF: Bioconcentration Factor

GHS: Globally harmonized Syatem of classification and labelling of chemicals

IATA: International Air Transport Association

IBC= Intermediate Bulk Container

IMDG International maritime Dangerous goods

LogPow = logarithm of the octanol/water partition coefficient

MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)

UN = United Nations

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SAFETY DATA SHEET

Isobutylene

Section 1. Identification

GHS product identifier : Isobutylene

Chemical name : 2-methylpropene

Other means of identification : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene); 1, 1-Dimethylethylene; Isopropylidenemethylene; iso-Butene; i-Butene; 2-Methylpropylene; 2-Methyl-2-propene; 2-Methyl-1-propene

Product type : Gas.

Product use : Synthetic/Analytical chemistry.

Synonym : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene); 1, 1-Dimethylethylene; Isopropylidenemethylene; iso-Butene; i-Butene; 2-Methylpropylene; 2-Methyl-2-propene; 2-Methyl-1-propene

SDS # : 001031

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24-hour telephone : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Liquefied gas

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements : Extremely flammable gas.
May form explosive mixtures with air.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach suspected leak area with caution.

Prevention : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Response : Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

Storage : Protect from sunlight. Store in a well-ventilated place.

Disposal : Not applicable.

Hazards not otherwise classified : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : 2-methylpropene

Other means of identification : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene); 1, 1-Dimethylethylene; Isopropylidenemethylene; iso-Butene; i-Butene; 2-Methylpropylene; 2-Methyl-2-propene; 2-Methyl-1-propene

Product code : 001031

CAS number/other identifiers

CAS number : 115-11-7

Ingredient name	%	CAS number
Isobutylene	100	115-11-7

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Section 4. First aid measures

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Use only non-sparking tools. Avoid contact with eyes, skin and clothing. Empty containers retain product residue and can be hazardous. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Eliminate all ignition sources. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F). Keep container tightly closed and sealed until ready for use. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Isobutylene	**ACGIH TLV (United States, 3/2017).** TWA: 250 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Section 8. Exposure controls/personal protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [Compressed gas.]

Color : Colorless.

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Melting point : -140.7°C (-221.3°F)

Boiling point : -6.9°C (19.6°F)

Critical temperature : 144.75°C (292.6°F)

Flash point : Closed cup: -76.1°C (-105°F)

Evaporation rate : Not available.

Flammability (solid, gas) : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and oxidizing materials.

Lower and upper explosive (flammable) limits : Lower: 1.8%
Upper: 9.6%

Vapor pressure : 24.3 (psig)

Vapor density : 1.94 (Air = 1)

Specific Volume (ft ^{3}/lb) : 6.6845

Gas Density (lb/ft ^{3}) : 0.1496 (25°C / 77 to °F)

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 0.26 g/l

Partition coefficient: n-octanol/water : 2.34

Auto-ignition temperature : 465°C (869°F)

Decomposition temperature : Not available.

Viscosity : Not applicable.

Flow time (ISO 2431) : Not available.

Molecular weight : 56.12 g/mole

Aerosol product

Heat of combustion : -45029034 J/kg

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

Incompatible materials : Oxidizers

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Isobutylene	LC50 Inhalation Vapor	Rat	550000 mg/m³	4 hours

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Section 11. Toxicological information

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Isobutylene	2.34	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Section 12. Ecological information

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1055	UN1055	UN1055	UN1055	UN1055
UN proper shipping name	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Additional information

DOT Classification : **Limited quantity** Yes.
Quantity limitation Passenger aircraft/rail: Forbidden. Cargo aircraft: 150 kg.
Special provisions 19, T50

TDG Classification : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2).
Explosive Limit and Limited Quantity Index 0.125
ERAP Index 3000
Passenger Carrying Ship Index Forbidden
Passenger Carrying Road or Rail Index Forbidden
Special provisions 29

IATA : **Quantity limitation** Passenger and Cargo Aircraft: Forbidden. Cargo Aircraft Only: 150 kg.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

Clean Air Act (CAA) 112 regulated flammable substances: Isobutylene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

Australia : This material is listed or exempted.

Canada : This material is listed or exempted.

China : This material is listed or exempted.

Europe : This material is listed or exempted.

Japan : **Japan inventory (ENCS)**: This material is listed or exempted.
Japan inventory (ISHL): Not determined.

Malaysia : Not determined.

New Zealand : This material is listed or exempted.

Philippines : This material is listed or exempted.

Republic of Korea : This material is listed or exempted.

Section 15. Regulatory information

Taiwan : This material is listed or exempted.

Thailand : Not determined.

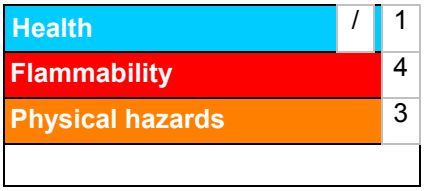
Turkey : Not determined.

United States : This material is listed or exempted.

Viet Nam : Not determined.

Section 16. Other information

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

National Fire Protection Association (U.S.A.)



Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
FLAMMABLE GASES - Category 1 GASES UNDER PRESSURE - Liquefied gas	Expert judgment Expert judgment

History

Date of printing : 5/10/2018

Date of issue/Date of revision : 5/10/2018

Date of previous issue : 7/11/2016

Version : 0.02

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973

Section 16. Other information

as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

References : Not available.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

SAFETY DATA SHEET

Version 4.10
Revision Date 04/22/2016
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Sudan Blue II

Product Number : 306436
Brand : Sigma-Aldrich

CAS-No. : 17354-14-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Not a hazardous substance or mixture.

2.2 GHS Label elements, including precautionary statements

Not a hazardous substance or mixture.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : Solvent Blue 35

Formula : $C_{22}H_{26}N_2O_2$
Molecular weight : 350.45 g/mol
CAS-No. : 17354-14-2
EC-No. : 241-379-4

No components need to be disclosed according to the applicable regulations.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions
No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
No special environmental precautions required.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: dark violet
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing	Melting point/range: 120 - 122 °C (248 - 252 °F)

	point	
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Nitrogen oxides (NOx)
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,4-Bis(butylamino)anthraquinone	17354-14-2	1989-08-11

New Jersey Right To Know Components

	CAS-No.	Revision Date
1,4-Bis(butylamino)anthraquinone	17354-14-2	1989-08-11

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.10 Revision Date: 04/22/2016 Print Date: 05/01/2016

SAFETY DATA SHEET

Creation Date 08-Nov-2010 **Revision Date** 18-Jun-2015 **Revision Number** 2

1. Identification

Product Name **Fluoranthene**

Cat No. : **AC119170000; AC119170250; AC119171000; AC119175000**

Synonyms Benzo[j,k]fluorene

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute oral toxicity	Category 4

Label Elements

Signal Word
Warning

Hazard Statements
Harmful if swallowed



Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell

Rinse mouth

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Very toxic to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
Fluoranthene	206-44-0	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion Do not induce vomiting. Get medical attention.

Most important symptoms/effects No information available.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. alcohol-resistant foam.

Unsuitable Extinguishing Media No information available

Flash Point 100 °C / 212 °F

Method - No information available

Autoignition Temperature No information available

Explosion Limits

Upper No data available

Lower No data available

Sensitivity to Mechanical Impact No information available

Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical

Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products

Carbon monoxide (CO) Carbon dioxide (CO_2)

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment.

Environmental Precautions See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Sweep up or vacuum up spillage and collect in suitable container for disposal.

7. Handling and storage

Handling Ensure adequate ventilation. Wear personal protective equipment. Avoid contact with skin and eyes. Do not breathe dust. Do not breathe vapors or spray mist. Avoid dust formation.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid
Appearance	Light green
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	109 - 111 °C / 228.2 - 231.8 °F
Boiling Point/Range	384 - 34 °C / 723.2 - 93.2 °F
Flash Point	100 °C / 212 °F
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	No information available
Relative Density	No information available
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C16 H10
Molecular Weight	202.25

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Fluoranthene	2 g/kg (Rat)	3180 mg/kg (Rabbit)	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Fluoranthene	206-44-0	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Fluoranthene	Not listed	Oncorhynchus mykiss: LC50=0.0077 mg/L 96h	Not listed	EC50: 0.78 mg/L 20h

Persistence and Degradability No information available
Bioaccumulation/ Accumulation No information available.

Mobility .

Component	log Pow
Fluoranthene	5.33

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Fluoranthene - 206-44-0	U120	-

14. Transport information

DOT
- **UN-No** UN3077
- **Proper Shipping Name** ENVIRONMENTALLY HAZARDOUS SUBSTANCE,SOLID, N.O.S.
- **Proper technical name** (Fluoranthene)
- **Hazard Class** 9
- **Packing Group** III

TDG
- **UN-No** UN3077
- **Proper Shipping Name** ENVIRONMENTALLY HAZARDOUS SUBSTANCE,SOLID, N.O.S.
- **Hazard Class** 9
- **Packing Group** III

IATA
- **UN-No** UN3077
- **Proper Shipping Name** Environmentally hazardous substance, solid, n.o.s
- **Hazard Class** 9
- **Packing Group** III

IMDG/IMO
- **UN-No** UN3077
- **Proper Shipping Name** Environmentally hazardous substance, solid, n.o.s
- **Hazard Class** 9
- **Packing Group** III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Fluoranthene	X	-	X	205-912-4	-		-	X	X	X	-

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Fluoranthene	206-44-0	>95	1.0 0.1

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Fluoranthene	-	-	X	X

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Fluoranthene	100 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Fluoranthene	X	X	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class D1B Toxic materials



16. Other information

Prepared By	Regulatory Affairs Thermo Fisher Scientific Email: EMSDS.RA@thermofisher.com
Creation Date	08-Nov-2010
Revision Date	18-Jun-2015
Print Date	18-Jun-2015
Revision Summary	This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

SAFETY DATA SHEET

Revision Date 10-Feb-2015 **Revision Number** 1

1. Identification

Product Name **Fluorene**

Cat No. : **AC156130000; AC156130250; AC156131000; AC156135000**

Synonyms Diphenylenemethane

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
Classification under 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Label Elements
None required

Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
May form combustible dust concentrations in air

3. Composition / information on ingredients

Component	CAS-No	Weight %
Fluorene	86-73-7	98

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated

clothes and shoes. Obtain medical attention.

Inhalation Remove from exposure, lie down. Move to fresh air. Obtain medical attention.

Ingestion Clean mouth with water. Get medical attention.

Most important symptoms/effects No information available.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. chemical foam.

Unsuitable Extinguishing Media No information available

Flash Point 151 °C / 303.8 °F
Method - No information available

Autoignition Temperature Not applicable
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Dust can form an explosive mixture in air. Do not allow run-off from fire fighting to enter drains or water courses.

Hazardous Combustion Products
None known
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
0	1	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained.

Methods for Containment and Clean Up Sweep up or vacuum up spillage and collect in suitable container for disposal. Do not let this chemical enter the environment.

7. Handling and storage

Handling Avoid contact with skin and eyes. Do not breathe dust. Do not ingest.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin and body protection	Wear appropriate protective gloves and clothing to prevent skin exposure.
Respiratory Protection	No protective equipment is needed under normal use conditions.
Hygiene Measures	Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid
Appearance	Beige
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	112 - 116 °C / 233.6 - 240.8 °F
Boiling Point/Range	298 °C / 568.4 °F @ 760 mmHg
Flash Point	151 °C / 303.8 °F
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	13 hPa @ 146 °C
Vapor Density	Not applicable
Relative Density	1.200
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	Not applicable
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	C13 H10
Molecular Weight	166.22

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Incompatible products.
Incompatible Materials	Strong oxidizing agents
Hazardous Decomposition Products	None under normal use conditions
Hazardous Polymerization	No information available.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information	No acute toxicity information is available for this product
Component Information	

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Fluorene	86-73-7	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

Persistence and Degradability Insoluble in water May persist
Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility.

Component	log Pow
Fluorene	4.18

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT Not regulated
TDG Not regulated
IATA
- **UN-No** 3077
- **Proper Shipping Name** ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.*
- **Hazard Class** 9
- **Packing Group** III

IMDG/IMO

UN-No	3077
Proper Shipping Name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class	9
Packing Group	III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Fluorene	X	X	-	201-695-5	-		X	X	X	X	-

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Fluorene	-	-	X	X

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
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Component	Hazardous Substances RQs	CERCLA EHS RQs
Fluorene	5000 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Fluorene	X	X	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class B4 Flammable solid



16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Revision Date 10-Feb-2015
Print Date 10-Feb-2015
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End of SDS

Safety Data Sheet

Material Name: Fuel Oil No. 2

SDS No. 0088
EU/CLP GHS

Synonyms: #2 Heating Oil; 2 Oil; Off-road Diesel Fuel

* * * Section 1 - Product and Company Identification * * *

Manufacturer Information

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

Phone: 732-750-6000 Corporate EHS
Emergency # 800-424-9300 CHEMTREC
www.hess.com (Environment, Health, Safety Internet Website)

* * * Section 2 - Hazards Identification * * *

GHS Classification:

Flammable Liquids - Category 3
Acute Toxicity, Inhalation - Category 4
Skin Corrosion/Irritation – Category 2
Eye Damage/Irritation – Category 2
Carcinogenicity - Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3 (respiratory irritation, narcosis)
Aspiration Hazard – Category 1
Hazardous to the Aquatic Environment, Acute Hazard – Category 3

GHS LABEL ELEMENTS

Symbol(s)



Signal Word

DANGER

Hazard Statements

Flammable liquid and vapor.
Harmful if inhaled.
Causes skin irritation.
Causes eye irritation.
Suspected of causing cancer.
Suspected of causing genetic defects.
May cause respiratory irritation.
May cause drowsiness or dizziness.
May be fatal if swallowed and enters airways.
Harmful to aquatic life.

Precautionary Statements

Prevention

Keep away from heat/sparks/open flames/hot surfaces. No smoking
Keep container tightly closed.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilating/lighting/equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Wear protective gloves/protective clothing/eye protection/face protection.
Avoid breathing fume/mist/vapors/spray.
Use only outdoors or in a well-ventilated area.
Wash hands and forearms thoroughly after handling.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Avoid release to the environment.

Response

In case of fire: Use water spray, fog or foam.
If on skin (or hair): Wash with plenty of soap and water. Take off immediately all contaminated clothing and wash it before reuse. If skin irritation occurs, get medical advice/attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center or doctor if you feel unwell.
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
If exposed or concerned: Get medical advice/attention.
If swallowed: Immediately all a poison center or doctor/physician if you feel unwell. Do NOT induce vomiting.

Storage

Store in a well ventilated place.
Keep cool. Keep container tightly closed.
Store locked up.

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 3 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
68476-30-2	Fuel oil No. 2	100
91-20-3	Naphthalene	<0.1

A complex combination of hydrocarbons with carbon numbers in the range C9 and higher produced from the distillation of petroleum crude oil.

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes

In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

First Aid: Skin

Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or with waterless hand cleanser. Obtain medical attention if irritation or redness develops.

First Aid: Ingestion

DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

First Aid: Inhalation

Remove person to fresh air. If person is not breathing, provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

* * * Section 5 - Fire Fighting Measures * * *

General Fire Hazards

See Section 9 for Flammability Properties.

Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

Hazardous Combustion Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

Extinguishing Media

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, or gaseous extinguishing agent.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Unsuitable Extinguishing Media

None

Fire Fighting Equipment/Instructions

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment. Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

* * * Section 6 - Accidental Release Measures * * *

Recovery and Neutralization

Carefully contain and stop the source of the spill, if safe to do so.

Materials and Methods for Clean-Up

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal.

Emergency Measures

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Personal Precautions and Protective Equipment

Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Environmental Precautions

Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Prevention of Secondary Hazards

None

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Handle as a combustible liquid. Keep away from heat, sparks, excessive temperatures and open flame! No smoking or open flame in storage, use or handling areas. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when this product is loaded into tanks previously containing low flash point products (such as gasoline) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents."

Storage Procedures

Keep containers closed and clearly labeled. Use approved vented storage containers. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks."

Incompatibilities

Keep away from strong oxidizers; Fluorel ®

* * * Section 8 - Exposure Controls / Personal Protection * * *

Component Exposure Limits

Fuel oil No. 2 (270-671-4)

ACGIH: 100 mg/m3 TWA (inhalable fraction and vapor, as total hydrocarbons, listed under Diesel fuel)
Skin - potential significant contribution to overall exposure by the cutaneous route (listed under Diesel fuel)

Belgium: 100 mg/m3 TWA (as total hydrocarbon, aerosol and vapor)
Skin (listed under Gas oil)

Portugal: 100 mg/m3 TWA [VLE-MP] (aerosol and vapor, as total Hydrocarbons, listed under Fuel diesel)

Naphthalene (202-049-5)

ACGIH: 15 ppm STEL
10 ppm TWA
Skin - potential significant contribution to overall exposure by the cutaneous route

Austria: 10 ppm TWA [TMW]; 50 mg/m3 TWA [TMW]
skin notation

Belgium: 15 ppm STEL; 80 mg/m3 STEL
10 ppm TWA; 53 mg/m3 TWA
Skin

Denmark: 10 ppm TWA; 50 mg/m3 TWA

Finland: 2 ppm STEL; 10 mg/m3 STEL
1 ppm TWA; 5 mg/m3 TWA

France: 10 ppm TWA [VME]; 50 mg/m3 TWA [VME]

Germany: 0.1 ppm TWA AGW (The risk of damage to the embryo or fetus can be excluded when MAK and BAT values are observed, inhalable fraction, exposure factor 1); 0.5 mg/m3 TWA AGW (The risk of damage to the embryo or fetus can be excluded when MAK and BAT values are observed, inhalable fraction, exposure factor 1)

Greece: 10 ppm TWA; 50 mg/m3 TWA

Ireland: 15 ppm STEL; 75 mg/m3 STEL
10 ppm TWA; 50 mg/m3 TWA

Netherlands: 80 mg/m3 STEL
50 mg/m3 TWA

Portugal: 10 ppm TWA [VLE-MP]

Spain: 15 ppm STEL [VLA-EC]; 80 mg/m3 STEL [VLA-EC]
10 ppm TWA [VLA-ED]; 53 mg/m3 TWA [VLA-ED]
skin - potential for cutaneous exposure

Sweden: 10 ppm LLV; 50 mg/m3 LLV
15 ppm STV; 80 mg/m3 STV

Engineering Measures

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Personal Protective Equipment: Respiratory

A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Personal Protective Equipment: Hands

Gloves constructed of nitrile, neoprene, or PVC are recommended.

Personal Protective Equipment: Eyes

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Personal Protective Equipment: Skin and Body

Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Red or reddish/orange colored (dyed)	**Odor:**	Mild, petroleum distillate odor
Physical State:	Liquid	**pH:**	ND
Vapor Pressure:	0.009 psia @ 70 °F (21 °C)	**Vapor Density:**	>1.0
Boiling Point:	340 to 700 °F (171 to 371 °C)	**Melting Point:**	ND
Solubility (H2O):	Negligible	**Specific Gravity:**	AP 0.823-0871
Evaporation Rate:	Slow; varies with conditions	**VOC:**	ND
Octanol/H2O Coeff.:	ND	**Flash Point:**	100 °F (38 °C) minimum
Flash Point Method:	PMCC	**Upper Flammability Limit (UFL):**	7.5
Lower Flammability Limit (LFL):	0.6	**Burning Rate:**	ND
Auto Ignition:	494°F (257°C)		

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will not occur.

Conditions to Avoid

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources.

Incompatible Products

Keep away from strong oxidizers; Fluorel ®

Hazardous Decomposition Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

* * * Section 11 - Toxicological Information * * *

Acute Toxicity

A: General Product Information

Harmful if swallowed.

B: Component Analysis - LD50/LC50

Fuel oil No. 2 (68476-30-2)

Oral LD50 Rat 12 g/kg; Dermal LD50 Rabbit 4720 µL/kg; Dermal LD50 Rabbit >2000 mg/kg; Inhalation LC50 Rat 4.6 mg/L 4 h

Naphthalene (91-20-3)

Inhalation LC50 Rat >340 mg/m3 1 h; Oral LD50 Rat 490 mg/kg; Dermal LD50 Rat >2500 mg/kg; Dermal LD50 Rabbit >20 g/kg

Product Mixture

Oral LD50 Rat 14.5 ml/kg; Dermal LD50 Rabbit >5 mL/kg; Guinea Pig Sensitization: negative; Primary dermal irritation: moderately irritating (Draize mean irritation score - 3.98 rabbits); Draize eye irritation: mildly irritating (Draize score, 48 hours, unwashed - 2.0 rabbits)

Potential Health Effects: Skin Corrosion Property/Stimulativeness

Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed.

Potential Health Effects: Eye Critical Damage/ Stimulativeness

Contact with eyes may cause mild irritation.

Potential Health Effects: Ingestion

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

Potential Health Effects: Inhalation

Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

Respiratory Organs Sensitization/Skin Sensitization

This product is not reported to have any skin sensitization effects.

Generative Cell Mutagenicity

This product is not reported to have any mutagenic effects. Material of similar composition has been positive in a mutagenicity study.

Carcinogenicity

A: General Product Information

Suspected of causing cancer.

Dermal carcinogenicity: positive - mice

Studies have shown that similar products produce skin tumors in laboratory animals following repeated applications without washing or removal. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation.

This product is similar to Diesel Fuel. IARC classifies whole diesel fuel exhaust particulates as probably carcinogenic to humans (Group 2A) and NIOSH regards it as a potential cause of occupational lung cancer based on animal studies and limited evidence in humans.

B: Component Carcinogenicity

Fuel oil No. 2 (68476-30-2)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans (listed under Diesel fuel)

Naphthalene (91-20-3)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
NTP: Reasonably Anticipated To Be A Human Carcinogen (Possible Select Carcinogen)
IARC: Monograph 82 [2002] (Group 2B (possibly carcinogenic to humans))

Reproductive Toxicity

This product is not reported to have any reproductive toxicity effects.

Specified Target Organ General Toxicity: Single Exposure

This product is not reported to have any specific target organ general toxicity single exposure effects.

Specified Target Organ General Toxicity: Repeated Exposure

This product is not reported to have any specific target organ general toxicity repeat exposure effects.

Aspiration Respiratory Organs Hazard

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

Very toxic to aquatic life with long lasting effects. Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Fuel oil No. 2 (68476-30-2)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	35 mg/L [flow-through]	

Naphthalene (91-20-3)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	5.74-6.44 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	1.6 mg/L [flow-through]	

96 Hr LC50 Oncorhynchus mykiss	0.91-2.82 mg/L [static]
96 Hr LC50 Pimephales promelas	1.99 mg/L [static]
96 Hr LC50 Lepomis macrochirus	31.0265 mg/L [static]
72 Hr EC50 Skeletonema costatum	0.4 mg/L
48 Hr LC50 Daphnia magna	2.16 mg/L
48 Hr EC50 Daphnia magna	1.96 mg/L [Flow through]
48 Hr EC50 Daphnia magna	1.09 - 3.4 mg/L [Static]

Persistence/Degradability

No information available.

Bioaccumulation

No information available.

Mobility in Soil

No information available.

* * * Section 13 - Disposal Considerations * * *

Waste Disposal Instructions

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

Disposal of Contaminated Containers or Packaging

Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 14 - Transportation Information * * *

IATA Information

Shipping Name: Heating oil, light
UN #: 1202 **Hazard Class:** 3 **Packing Group:** III

ICAO Information

Shipping Name: Heating oil, light
UN #: 1202 **Hazard Class:** 3 **Packing Group:** III

IMDG Information

Shipping Name: Heating oil, light
UN #: 1202 **Hazard Class:** 3 **Packing Group:** III

* * * Section 15 - Regulatory Information * * *

Regulatory Information

Component Analysis – Inventory

Component/CAS	EC #	EEC	CAN	TSCA
Fuel oil No. 2 68476-30-2	270-671-4	EINECS	DSL	Yes
Naphthalene 91-20-3	202-049-5	EINECS	DSL	Yes

* * * Section 16 - Other Information * * *

Key/Legend

ACGIH = American Conference of Governmental Industrial Hygienists; ADG = Australian Code for the Transport of Dangerous Goods by Road and Rail; ADR/RID = European Agreement of Dangerous Goods by Road/Rail; AS = Standards Australia; DFG = Deutsche Forschungsgemeinschaft; DOT = Department of Transportation; DSL = Domestic Substances List; EEC = European Economic Community; EINECS = European Inventory of Existing Commercial Chemical Substances; ELINCS = European List of Notified Chemical Substances; EU = European Union; HMIS = Hazardous Materials Identification System; IARC = International Agency for Research on Cancer; IMO = International Maritime Organization; IATA = International Air Transport Association; MAK = Maximum Concentration Value in the Workplace; NDSL = Non-Domestic Substances List; NFPA = National Fire Protection Association; NOHSC = National Occupational Health & Safety Commission; NTP = National Toxicology Program; STEL = Short-term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average

Literature References

None

Other Information

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

End of Sheet

Safety Data Sheet - Version 5.0

Preparation Date 9/15/2015
Latest Revision Date (If Revised)
SDS Expiry Date 9/13/2018

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product Identifier

Chemical Name γ-Chlordane

Catalogue # C327040

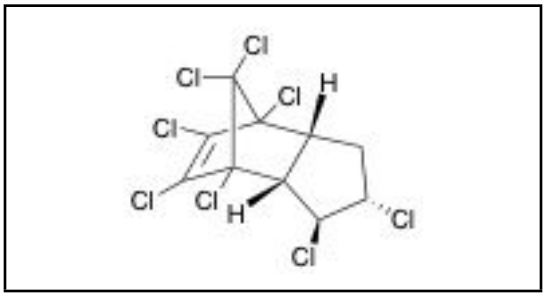
1.2 Relevant Identified Uses of the Substance or Mixture and Uses Advised Against

Product Uses To be used only for scientific research and development. Not for use in humans or animals.

1.3 Details of the Supplier of the Safety Data Sheet

Company Toronto Research Chemicals
2 Brisbane Road
Toronto, ON M3J 2J8
CANADA

Telephone +14166659696
FAX +14166654439
Email orders@trc-canada.com



1.4 Emergency Telephone Number

Emergency# +14166659696 between 0800-1700 (GMT-5)

2. HAZARDS IDENTIFICATION

WHMIS Classification (Canada)

D2A Very Toxic Material Causing Other Toxic Effects
Carcinogen

WHMIS Symbols (Canada)



2.1/2.2 Classification of the Substance or Mixture and Label Elements

GHS Hazards Classification (According to EU Regulation 1272/2008 and US OSHA 1910.1200)

Acute Toxicity, Oral (Category 4)
Carcinogenicity (Category 2)
Hazardous to the Aquatic Environment, Acute Hazard (Category 1)

EU Classification (According to EU Regulation 67/548/EEC)

Harmful if swallowed. May cause cancer. Very toxic to aquatic organisms.

EU Risk and Safety Statements (According to EU Regulation 67/548/EEC)

Hazard Statements	Hazard Codes
Harmful	Xn
Environmental Hazard	N





Risk Codes and Phrases

R22	Harmful if swallowed.
R45	May cause cancer.
R50	Very toxic to aquatic organisms.

Safety Precaution Codes and Phrases

S61	Avoid release to the environment. Refer to special instructions.

S36/37/39 Wear suitable protective clothing, gloves and eye/face protection.

GHS Hazards Identification (According to EU Regulation 1272/2008 and US OSHA 1910.1200)

Signal Word Warning



GHS Hazard Statements

H302	Harmful if swallowed.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.

GHS Precautionary Statements

P273	Avoid release to the environment.
P281	Use personal protective equipment as required.

2.3 Unclassified Hazards/Hazards Not Otherwise Classified

No data available.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Molecular Formula: $C_{10}H_6Cl_8$ **Molecular Weight:** 409.78

CAS Registry #: 5103-74-2 **EC#:** 225-826-0

Synonyms

(1R,2R,3aS,4S,7R,7aS)-rel-1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-,4,7-methano-1H-indene; (1α,2β,3aα,4β,7β,7aα)-1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methano-1H-indene; 1β,2α,4α,5,6,7α,8,8-Octachloro-3aβ,4,7,7aβ-tetrahydro4,7-methanoindan; (±)-trans-Chlordane; trans-Chlordan; trans -1,2,4,5,6,7,8,8-Octachloro-3a,4,7,7a-tetrahydro-4,7-endo-methanoindan; trans-Chlordan; trans-Chlordane; β-Chlordan; β-Chlordane;

3.2 Mixtures

Not a mixture.

4. FIRST AID MEASURES

4.1 Description of First Aid Measures

General Advice

If medical attention is required, show this safety data sheet to the doctor.

If Inhaled

If inhaled, move person to fresh air. If not breathing, give artificial respiration and consult a physician.

In Case of Skin Contact

Wash affected area with soap and water. Consult a physician if any exposure symptoms are observed.

In Case of Eye Contact

Immediately rinse eyes with plenty of water for at least 15 minutes. Consult a physician.

If Swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Do NOT induce vomiting unless advised to do so by a physician or Poison Control Center. Seek medical attention.

4.2 Most Important Symptoms and Effects, Both Acute and Delayed

The most important known symptoms and effects are described in the labeling (see section 2.2) and/or in section 11.

4.3 Indication of any Immediate Medical Attention and Special Treatment Needed

No data available.

5. FIREFIGHTING MEASURES

5.1 Extinguishing Media

Conditions of flammability
Not flammable or combustible.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.2 Special Hazards Arising from the Substance or Mixture
Carbon oxides, Hydrogen chloride

5.3 Advice for Firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further Information
No data available.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Method and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.
Keep in a dry place.

Storage conditions: No Data Available

7.3 Specific End Uses
For scientific research and development only. Not for use in humans or animals.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control Parameters
Contains no components with established occupational exposure limits.

8.2 Exposure Controls

Appropriate Engineering Controls
A laboratory fumehood or other appropriate form of local exhaust ventilation should be used to avoid exposure.

Personal Protective Equipment
All recommendations below are advisory in nature and a risk assessment should be performed by the employer/end user prior to use of this product. The type of protective equipment must be selected based on the amount and concentration of the dangerous material being used in the workplace.

Eye/Face Protection
Safety goggles or face shield. All equipment should have been tested and approved under appropriate standards, such as NIOSH (US), CSA (Canada), or EN 166 (EU).

Skin Protection
Gloves should be used when handling this material. Gloves are to be inspected prior to use. Contaminated gloves are to be removed using proper glove removal technique so that the outer surface of the glove does not contact bare skin. Dispose of contaminated gloves after use in compliance with good laboratory practices and local requirements.

Gloves used for incidental exposures (splash protection) should be designated as “chemical resistant” by EU standard EN 374 with the resistance codes corresponding to the anticipated use of the material. Unrated gloves are not recommended.
Suggested gloves: AnsellPro Sol-Vex nitrile gloves style 37-175, 15 mil thickness.
Penetration time has not been determined.

Gloves used for prolonged direct exposure (immersion) should be designated “chemical resistant” as per EN 734 with the resistance codes corresponding to the anticipated use of the material.
Suggested gloves: AnsellPro Viton/Butyl gloves style 38-612, 4/8 mil thickness.
Penetration time has not been determined.

These recommendations may not apply if the material is mixed with any other chemical, or dissolved into a solution. A risk assessment must be performed to ensure the gloves will still offer acceptable protection.

Body Protection
Fire resistant (Nomex) coveralls or chemical-resistant bodysuit (laminated Tychem SL or equivalent).

Respiratory Protection
Recommended respirators are NIOSH-approved N100 or CEN-approved FFP3 particulate respirators. These are to be only used as a backup to local exhaust ventilation or other engineering controls. If the respirator is the only means of protection, a full-face supplied air respirator must be used.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on Basic Physical and Chemical Properties

A) Appearance
No Data Available

B) Odour
odourless

C) Odour Threshold
No data available.

D) pH
No data available.

E) Melting Point/Freezing Point
No Data Available

F) Initial Boiling Point/Boiling Range
No data available.

G) Flash point
No data available.

H) Evaporation Rate
No data available.

I) Flammability (Solid/Gas)
No data available.

J) Upper/Lower Flammability/Explosive Limits
No data available.

K) Vapour Pressure
No data available.

L) Vapour Density
No data available.

M) Relative Density
1.590 g/cm3

N) Solubility
No Data Available

O) Partition Coefficient: n-octanol/water
No data available.

P) Auto-Ignition Temperature
No data available.

Q) Decomposition Temperature
No data available.

R) Viscosity
No data available.

S) Explosive Properties
No data available.

T) Oxidizing Properties
No data available.

9.2 Other Information
no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available.

10.2 Chemical Stability
Stable under recommended storage conditions.

10.3 Possibility of Hazardous Reactions
No data available.

10.4 Conditions to Avoid
No data available.

10.5 Incompatible Materials

Strong oxidizing agents.

10.6 Hazardous Decomposition Products

Other decomposition products: No data available. In the event of fire: see section 5.

11. TOXICOLOGICAL INFORMATION

11.1 Information on Toxicological Effects

A) Acute Toxicity

Oral LD50: Mouse - 275 mg/kg

Rat - 1,100 mg/kg

Inhalation LC50: No data available.

Dermal LD50: No data available.

B) Skin Corrosion/Irritation

No data available

C) Serious Eye Damage/Irritation

No data available

D) Respiratory or Skin Sensitization

No data available

E) Germ Cell Mutagenicity

No data available

F) Carcinogenicity

Evidence of a carcinogenic effect.

This compound has been designated by the IARC as Group 2B: Possibly carcinogenic to humans.

G) Reproductive Toxicity/Teratogenicity

No data available

H) Single Target Organ Toxicity - Single Exposure

No data available

I) Single Target Organ Toxicity - Repeated Exposure

No data available

J) Aspiration Hazard

No data available

K) Potential Health Effects and Routes of Exposure

Inhalation

May be harmful if inhaled. May cause respiratory tract irritation.

Ingestion

Harmful if swallowed.

Skin

Harmful if absorbed through skin. May cause skin irritation.

Eyes

May cause eye irritation.

L) Signs and Symptoms of Exposure

The most important known symptoms and effects are described in the labeling (see section 2.2) and/or in section 11.

To the best of our knowledge, the chemical, physical, and toxicological properties of this material have not been thoroughly investigated.

M) Additional Information

RTECS: PC0365000

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish:

LC50 - Lepomis macrochirus - 0.05 mg/l - 96 h

12.2 Persistance and Degradability

No data available.

12.3 Bioaccumulative Potential

No data available.

12.4 Mobility in Soil

No data available.

12.5 Results of PBT and vPvB Assessment

No data available.

12.6 Other Adverse Effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste Treatment Methods

A) Product

Product may be burned in an incinerator equipped with afterburner and scrubber. Excess and expired materials are to be offered to a licensed hazardous material disposal company. Ensure that all Federal and Local regulations regarding the disposal and destruction of this material are followed.

B) Contaminated Packaging

Dispose of as above.

C) Other Considerations

Product is not to be disposed of in sanitary sewers, storm sewers, or landfills.

14. TRANSPORT INFORMATION

14.1 UN Number

DOT (US): UN3077 IATA: UN3077 IMDG: UN3077 ADR/RID: UN3077

14.2 UN Proper Shipping Name

DOT (US)/IATA:
Environmentally hazardous substances, solid, n.o.s. (trans-Chlordane)
IMDG/ARD/RID:
ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (trans-Chlordane)

14.3 Transport Hazard Class(es)

DOT (US): 9 IATA: 9 IMDG: 9 ADR/RID: 9

14.4 Packing Group

DOT (US): III IATA: III IMDG: III ADR/RID: III

14.5 Environmental Hazards

DOT (US): None IATA: None IMDG: Marine pollutant ADR/RID: None

14.6 Special Precautions for User

None

15. REGULATORY INFORMATION

This safety data sheet complies with the requirements of WHMIS (Canada), OSHA 1910.1200 (US), and EU Regulation EC No. 1907/2006 (European Union).

15.1 Safety, Health and Environmental Regulations/Legislation Specific for the Substance or Mixture

A) Canada

DSL/NDSL Status: This product is not listed on the Canadian DSL/NDSL.

B) United States

TSCA Status: This product is not listed on the US EPA TSCA.

C) European Union

ECHA Status: This product is not registered with the EU ECHA.

15.2 Chemical Safety Assessment

No data available

16. OTHER INFORMATION

16.1 Revision History

Original Publication Date: 9/15/2015

16.2 List of Abbreviations

LD50	Median lethal dose of a substance required to kill 50% of a test population.
LC50	Medial lethal concentration of a substance required to kill 50% of a test population.
LDLo	Lowest known lethal dose
TDLo	Lowest known toxic dose
IARC	International Agency for Research on Cancer
NTP	National Toxicology Program
RTECS	Registry of Toxic Effects of Chemical Substances

16.3 Further Information

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believed to be correct to the best of our knowledge, but is to be only used as a guide. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated. Please take all due care when handling this product.

SAFETY DATA SHEET

SDS ID NO.: 0127MAR019
Revision Date: 06/01/2016

1. IDENTIFICATION

Product Name: Marathon Petroleum Gasoline - All Grades

Synonym: Gasoline; Regular Unleaded Gasoline; Conventional Regular Unleaded Gasoline; Mid Grade Unleaded Gasoline; Conventional Mid Grade Unleaded Gasoline; Premium Unleaded Gasoline; Conventional Premium Unleaded Gasoline; Sub-Octane Gasoline; Regular RBOB; Super RBOB; Premium RBOB; RBOB; Reformulated Blend Stock For Oxygenated Blending; 84 Octane Gasoline; CBOB; Premium CBOB; Conventional Blend Stock for Oxygenate Blending; Recreational Gasoline; Recreational Gasoline; Recreational Unleaded Gasoline; 89 Recreational Gasoline; Brand 89 Recreational Gasoline; 7.0 Max RVP 89 Recreational Gasoline; BR 7.0 Max RVP 89 Recreational Gasoline; 90 Recreational Gasoline; 90 Marina Gasoline; Brand 91 Recreational Gasoline; 91 Recreational Gasoline; 91 Marina Gasoline; 90 Octane Midgrade Gasoline with No Ethanol; 0125MAR019; 0126MAR019; 0134MAR019; 0313MAR019; 0314MAR019

Chemical Family: Complex Hydrocarbon Substance

Recommended Use: Fuel.
Restrictions on Use: All others.

Manufacturer, Importer, or Responsible Party Name and Address:

MARATHON PETROLEUM COMPANY LP
539 South Main Street
Findlay, OH 45840

SDS information: 1-419-421-3070

Emergency Telephone: 1-877-627-5463

2. HAZARD IDENTIFICATION

Classification

OSHA Regulatory Status
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 1
Skin corrosion/irritation	Category 2
Germ cell mutagenicity	Category 1B
Carcinogenicity	Category 1B
Reproductive toxicity	Category 2
Specific target organ toxicity (single exposure)	Category 3
Aspiration toxicity	Category 1
Acute aquatic toxicity	Category 2
Chronic aquatic toxicity	Category 2

Hazards Not Otherwise Classified (HNOC)

Static accumulating flammable liquid

Label elements

EMERGENCY OVERVIEW

Danger

EXTREMELY FLAMMABLE LIQUID AND VAPOR
May accumulate electrostatic charge and ignite or explode
May be fatal if swallowed and enters airways
Causes skin irritation
May cause respiratory irritation
May cause drowsiness or dizziness
May cause genetic defects
May cause cancer
Suspected of damaging fertility or the unborn child
Toxic to aquatic life with long lasting effects



Appearance Clear yellow liquid **Physical State** Liquid **Odor** Hydrocarbon

Precautionary Statements - Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools.
Take precautionary measures against static discharge
Avoid breathing mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection
Wash hands and any possibly exposed skin thoroughly after handling
Avoid release to the environment

Precautionary Statements - Response
IF exposed or concerned: Get medical attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
If skin irritation occurs: Get medical attention
Wash contaminated clothing before reuse
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor if you feel unwell
IF SWALLOWED: Immediately call a POISON CENTER or doctor
Do NOT induce vomiting
In case of fire: Use water spray, fog or regular foam for extinction
Collect spillage

Precautionary Statements - Storage
Store in a well-ventilated place. Keep container tightly closed
Keep cool
Store locked up

Precautionary Statements - Disposal
Dispose of contents/container at an approved waste disposal plant

3. COMPOSITION/INFORMATION ON INGREDIENTS

Gasoline is a complex combination of hydrocarbons consisting of paraffins, cycloparaffins, aromatic and olefinic hydrocarbons having molecular chains ranging in length from four to ten carbons. May contain small amounts of dye and other additives (>0.02%) which are not considered hazardous at the concentrations used.

Composition Information:

Name	CAS Number	% Concentration
Gasoline	86290-81-5	100
Heptane (mixed isomers)	142-82-5	2.5-26
Pentane (mixed isomers)	78-78-4	6.5-19
Butane (mixed isomers)	106-97-8	0.5-14
Hexane Isomers (other than n-Hexane)	107-83-5	2-12
Toluene	108-88-3	3-9.5
Xylene (mixed isomers)	1330-20-7	3.5-9.5
n-Hexane	110-54-3	0.1-4.5
Cumene	98-82-8	0-4
1,2,4 Trimethylbenzene	95-63-6	1-4
Ethylbenzene	100-41-4	0.5-2.5
Benzene	71-43-2	0.1-1.5
Cyclohexane	110-82-7	0-1.5
Octane	111-65-9	0-1.5
1,2,3-trimethylbenzene	526-73-8	0-1
Naphthalene	91-20-3	0.1-0.5

All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

4. FIRST AID MEASURES

First Aid Measures

General Advice: In case of accident or if you feel unwell, seek medical advice immediately (show directions for use or safety data sheet if possible).

Inhalation: Remove to fresh air. If not breathing, institute rescue breathing. If breathing is difficult, ensure airway is clear, give oxygen and continue to monitor. If heart has stopped, immediately begin cardiopulmonary resuscitation (CPR). Keep affected person warm and at rest. If symptoms occur get medical attention.

Skin Contact: Immediately wash exposed skin with plenty of soap and water while removing contaminated clothing and shoes. May be absorbed through the skin in harmful amounts. Get medical attention if irritation persists. Any injection injury from high pressure equipment should be evaluated immediately by a physician as potentially serious (See NOTES TO PHYSICIAN).

Place contaminated clothing in closed container until cleaned or discarded. If clothing is to be laundered, inform the person performing the operation of contaminant's hazardous properties. Destroy contaminated, non-chemical resistant footwear.

Eye Contact: Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Gently remove contacts while flushing. Get medical attention if irritation persists.

Ingestion: Do not induce vomiting because of danger of aspirating liquid into lungs, causing serious damage and chemical pneumonitis. If spontaneous vomiting occurs, keep head below hips, or if patient is lying down, turn body and head to side to prevent aspiration and monitor for breathing difficulty. Never give anything by mouth to an unconscious person. Keep affected person warm and at rest. GET IMMEDIATE MEDICAL ATTENTION.

Most important signs and symptoms, both short-term and delayed with overexposure

Adverse Effects: Irritating to the skin and mucous membranes. Symptoms may include redness, itching, and inflammation. May cause nausea, vomiting, diarrhea, and signs of nervous system depression: headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue. Aspiration hazard. May cause coughing, chest pains, shortness of breath, pulmonary edema and/or chemical pneumonitis. Repeated or prolonged skin contact may cause drying, reddening, itching and cracking.

Indication of any immediate medical attention and special treatment needed

Notes To Physician: INHALATION: This material (or a component) sensitizes the myocardium to the effects of sympathomimetic amines. Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in individuals exposed to this material. Administration of sympathomimetic drugs should be avoided.

SKIN: Leaks or accidents involving high-pressure equipment may inject a stream of material through the skin and initially produce an injury that may not appear serious. Only a small puncture wound may appear on the skin surface but, without proper treatment and depending on the nature, original pressure, volume, and location of the injected material, can compromise blood supply to an affected body part. Prompt surgical debridement of the wound may be necessary to prevent irreversible loss of function and/or the affected body part. High pressure injection injuries may be SERIOUS SURGICAL EMERGENCIES.

INGESTION: This material represents a significant aspiration and chemical pneumonitis hazard. Induction of emesis is not recommended.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For small fires, Class B fire extinguishing media such as CO2, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFF/ATC) can be used. Firefighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Unsuitable extinguishing media
Do not use straight water streams to avoid spreading fire.

Specific hazards arising from the chemical
This product has been determined to be an extremely flammable liquid per the OSHA Hazard Communication Standard and should be handled accordingly. May accumulate electrostatic charge and ignite or explode. Vapors may travel along the ground or be moved by ventilation and ignited by many sources such as pilot lights, sparks, electric motors, static discharge, or other ignition sources at locations distant from material handling. Flashback can occur along vapor trail. For additional fire related information, see NFPA 30 or the Emergency Response Guidebook 128.

Hazardous combustion products
Smoke, carbon monoxide, and other products of incomplete combustion.

Explosion data
Sensitivity to Mechanical Impact No.
Sensitivity to Static Discharge Yes.

Special protective equipment and precautions for firefighters
Firefighters should wear full protective clothing and positive-pressure self-contained breathing apparatus (SCBA) with a full face-piece, as appropriate. Avoid using straight water streams. Water may be ineffective in extinguishing low flash point fires, but can be used to cool exposed surfaces. Avoid excessive water spray application. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Keep run-off water out of sewers and water sources.

Additional firefighting tactics
FIRES INVOLVING TANKS OR CAR/TRAILER LOADS: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after the fire is out. Do not direct water at source of leak or safety devices; icing may occur. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles: if this is impossible, withdraw from area and let fire burn.

EVACUATION: Consider initial downwind evacuation for at least 1000 feet. If tank, rail car or tank truck is involved in a fire, ISOLATE for 5280 feet (1 mile) in all directions; also, consider initial evacuation of 5280 feet (1 mile) in all directions.

NFPA	Health 1	Flammability 3	Instability 0	Special Hazard -

6. ACCIDENTAL RELEASE MEASURES

Personal precautions:	Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources.
Protective equipment:	Use personal protection measures as recommended in Section 8.
Emergency procedures:	Advise authorities and National Response Center (800-424-8802) if the product has entered a water course or sewer. Notify local health and pollution control agencies, if appropriate.
Environmental precautions:	Avoid release to the environment. Avoid subsoil penetration. Ethanol in gasoline phase seperates in contact with water. Monitor downstream for dissolved ethanol or other appropriate indicators.
Methods and materials for containment:	Contain liquid with sand or soil. Prevent spilled material from entering storm drains, sewers, and open waterways.
Methods and materials for cleaning up:	Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids. Recover and return free product to proper containers. When recovering free liquids ensure all equipment is grounded and bonded. Use only non-sparking tools.

7. HANDLING AND STORAGE

Safe Handling Precautions:

NEVER SIPHON THIS PRODUCT BY MOUTH. Use appropriate grounding and bonding practices. Static accumulating flammable liquid. Bonding and grounding may be insufficient to eliminate the hazard from static electricity. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Vapors may travel along the ground or be moved by ventilation. Flashback may occur along vapor trails. No smoking. Use only non-sparking tools. Avoid contact with skin, eyes and clothing. Avoid breathing fumes, gas, or vapors. Use only with adequate ventilation. Avoid repeated and prolonged skin contact. Use personal protection measures as recommended in Section 8. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water. Do not cut, drill, grind or weld on empty containers since explosive residues may remain. Refer to applicable EPA, OSHA, NFPA and consistent state and local requirements.

Hydrocarbons are basically non-conductors of electricity and can become electrostatically charged during mixing, filtering, pumping at high flow rates or loading and transfer operations. If this charge reaches a sufficiently high level, sparks can form that may ignite the vapors of flammable liquids. Sudden release of hot organic chemical vapors or mists from process equipment operating under elevated temperature and pressure, or sudden ingress of air into vacuum equipment may result in ignition of vapors or mists without the presence of obvious ignition sources. Nozzle spouts must be kept in contact with the containers or tank during the entire filling operation.

Portable containers should never be filled while in or on a motor vehicle or marine craft. Containers should be placed on the ground. Static electric discharge can ignite fuel vapors when filling non-grounded containers or vehicles on trailers. The nozzle spout must be kept in contact with the container before and during the entire filling operation. Use only approved containers.

A buildup of static electricity can occur upon re-entry into a vehicle during fueling especially in cold or dry climate conditions. The charge is generated by the action of dissimilar fabrics (i.e., clothing and upholstery) rubbing across each other as a person enters/exits the vehicle. A flash fire can result from this discharge if sufficient flammable vapors are present. Therefore, do not get back in your vehicle while refueling.

Cellular phones and other electronic devices may have the potential to emit electrical charges (sparks). Sparks in potentially explosive atmospheres (including fueling areas such as gas stations) could cause an explosion if sufficient flammable vapors are present. Therefore, turn off cellular phones and other electronic devices when working in potentially explosive atmospheres or keep devices inside your vehicle during refueling.

High-pressure injection of any material through the skin is a serious medical emergency even though the small entrance wound at the injection site may not initially appear serious. These injection injuries can occur from high-pressure equipment such as paint spray or grease or guns, fuel injectors, or pinhole leaks in hoses or hydraulic lines and should all be considered serious. High pressure injection injuries may be SERIOUS SURGICAL EMERGENCIES (See First Aid Section 4).

Storage Conditions:

Store in properly closed containers that are appropriately labeled and in a cool, well-ventilated area. Do not store near an open flame, heat or other sources of ignition.

Incompatible Materials

Strong oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Name	ACGIH TLV	OSHA PELS:	OSHA - Vacated PELs	NIOSH IDLH
Gasoline 86290-81-5	300 ppm TWA 500 ppm STEL	-	300 ppm TWA 900 mg/m^3 TWA 500 ppm STEL 1500 mg/m^3 STEL	-

Heptane (mixed isomers) 142-82-5	400 ppm TWA 500 ppm STEL	TWA: 500 ppm TWA: 2000 mg/m³	400 ppm TWA 1600 mg/m³ TWA 500 ppm STEL 2000 mg/m³ STEL	750 ppm
Pentane (mixed isomers) 78-78-4	1000 ppm TWA	-	-	-
Butane (mixed isomers) 106-97-8	1000 ppm STEL	-	800 ppm TWA 1900 mg/m³ TWA	-
Hexane Isomers (other than n-Hexane) 107-83-5	500 ppm TWA 1000 ppm STEL	-	500 ppm TWA 1800 mg/m³ TWA 1000 ppm STEL 3600 mg/m³ STEL	-
Toluene 108-88-3	20 ppm TWA	TWA: 200 ppm Ceiling: 300 ppm	100 ppm TWA 375 mg/m³ TWA 150 ppm STEL 560 mg/m³ STEL	500 ppm
Xylene (mixed isomers) 1330-20-7	100 ppm TWA 150 ppm STEL	TWA: 100 ppm TWA: 435 mg/m³	100 ppm TWA 435 mg/m³ TWA 150 ppm STEL 655 mg/m³ STEL	900 ppm
n-Hexane 110-54-3	50 ppm TWA Skin - potential significant contribution to overall exposure by the cutaneous route	TWA: 500 ppm TWA: 1800 mg/m³	50 ppm TWA 180 mg/m³ TWA	1100 ppm
Cumene 98-82-8	50 ppm TWA	TWA: 50 ppm TWA: 245 mg/m³ Skin	50 ppm TWA 245 mg/m³ TWA Limit applies to skin	900 ppm
1,2,4 Trimethylbenzene 95-63-6	25 ppm TWA	-	25 ppm TWA 125 mg/m³ TWA	-
Ethylbenzene 100-41-4	20 ppm TWA	TWA: 100 ppm TWA: 435 mg/m³	100 ppm TWA 435 mg/m³ TWA 125 ppm STEL 545 mg/m³ STEL	800 ppm
Benzene 71-43-2	0.5 ppm TWA 2.5 ppm STEL Skin - potential significant contribution to overall exposure by the cutaneous route	TWA: 10 ppm (applies to industry segments exempt from the benzene standard) TWA: 1 ppm STEL: 5 ppm (see 29 CFR 1910.1028)	25 ppm Ceiling 1 ppm TWA 5 ppm STEL	500 ppm
Cyclohexane 110-82-7	100 ppm TWA	TWA: 300 ppm TWA: 1050 mg/m³	300 ppm TWA 1050 mg/m³ TWA	1300 ppm
Octane 111-65-9	300 ppm TWA	TWA: 500 ppm TWA: 2350 mg/m³	300 ppm TWA 1450 mg/m³ TWA 375 ppm STEL 1800 mg/m³ STEL	1000 ppm
1,2,3-trimethylbenzene 526-73-8	25 ppm TWA	-	25 ppm TWA 125 mg/m³ TWA	-
Naphthalene 91-20-3	10 ppm TWA Skin - potential significant contribution to overall exposure by the cutaneous route	TWA: 10 ppm TWA: 50 mg/m³	10 ppm TWA 50 mg/m³ TWA 15 ppm STEL 75 mg/m³ STEL	250 ppm

Notes: The manufacturer has voluntarily elected to provide exposure limits contained in OSHA's 1989 air contaminants standard in its SDSs, even though certain of those exposure limits were vacated in 1992.

Engineering measures: Local or general exhaust required in an enclosed area or when there is inadequate ventilation. Use mechanical ventilation equipment that is explosion-proof.

Personal protective equipment

Eye protection: Use goggles or face-shield if the potential for splashing exists.

Skin and body protection: Use nitrile rubber, Viton® or PVA gloves for repeated or prolonged skin exposure. Glove suitability is based on workplace conditions and usage. Contact the glove manufacturer for specific advice on glove selection and breakthrough times.

Respiratory protection: Use a NIOSH approved organic vapor chemical cartridge or supplied air respirators when there is the potential for airborne exposures to exceed permissible exposure limits or if excessive vapors are generated. Observe respirator assigned protection factors (APFs) criteria cited in federal OSHA 29 CFR 1910.134. Self-contained breathing apparatus should be used for fire fighting.

Hygiene measures: Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical State	Liquid
Appearance	Clear yellow liquid
Color	Yellow
Odor	Hydrocarbon
Odor Threshold	No data available.

Property	**Values (Method)**
Melting Point / Freezing Point	No data available.
Initial Boiling Point / Boiling Range	24-210 °C / 75-410 °F (ASTM D86)
Flash Point	-43 °C / -45 °F
Evaporation Rate	No data available.
Flammability (solid, gas)	Not applicable.
Flammability Limit in Air (%):	
Upper Flammability Limit:	7.6
Lower Flammability Limit:	1.4
Explosion limits:	No data available.
Vapor Pressure	5.5-15 psi (ASTM D4814)
Vapor Density	3-4
Specific Gravity / Relative Density	0.70-0.76
Water Solubility	No data available.
Solubility in other solvents	No data available.
Partition Coefficient	2.13-4.5
Decomposition temperature	No data available.
pH:	Not applicable
Autoignition Temperature	280 °C / 536 °F
Kinematic Viscosity	No data available.
Dynamic Viscosity	No data available.
Explosive Properties	No data available.
VOC Content (%)	100%
Density	No data available.
Bulk Density	Not applicable.

10. STABILITY AND REACTIVITY

Reactivity The product is non-reactive under normal conditions.

Chemical stability The material is stable at 70°F, 760 mmHg pressure.

Possibility of hazardous reactions None under normal processing.

Hazardous polymerization Will not occur.

Conditions to avoid Excessive heat, sources of ignition, open flame.

Incompatible Materials Strong oxidizing agents.

Hazardous decomposition products None known under normal conditions of use.

11. TOXICOLOGICAL INFORMATION

Potential short-term adverse effects from overexposures

Inhalation May cause irritation of respiratory tract. May cause drowsiness or dizziness. Breathing high concentrations of this material in a confined space or by intentional abuse can cause irregular heartbeats which can cause death.

Eye contact Exposure to vapor or contact with liquid may cause mild eye irritation, including tearing, stinging, and redness.

Skin contact Causes skin irritation. Effects may become more serious with repeated or prolonged contact. May be absorbed through the skin in harmful amounts.

Ingestion May be fatal if swallowed or vomited and enters airways. May cause irritation of the mouth, throat and gastrointestinal tract.

Acute toxicological data

Name	Oral LD50	Dermal LD50	Inhalation LC50
Gasoline 86290-81-5	14000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 5.2 mg/L (Rat) 4 h
Heptane (mixed isomers) 142-82-5	-	3000 mg/kg (Rabbit)	103 g/m³ (Rat) 4 h
Pentane (mixed isomers) 78-78-4	-	-	450 mg/L (Mouse) 2 h
Butane (mixed isomers) 106-97-8	-	-	658 mg/L (Rat) 4 h
Hexane Isomers (other than n-Hexane) 107-83-5	> 5000 mg/kg (Rat)	-	-
Toluene 108-88-3	> 2000 mg/kg (Rat)	8390 mg/kg (Rabbit)	12.5 mg/L (Rat) 4 h
Xylene (mixed isomers) 1330-20-7	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 5.04 mg/L (Rat) 4 h
n-Hexane 110-54-3	15000 mg/kg (Rat)	3000 mg/kg (Rabbit)	48000 ppm (Rat) 4 h
Cumene 98-82-8	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 20 mg/L (Rat) 6 h
1,2,4 Trimethylbenzene 95-63-6	3280 mg/kg (Rat)	> 3160 mg/kg (Rabbit)	18,000 mg/m³ (Rat) 4 h
Ethylbenzene 100-41-4	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	17.2 mg/L (Rat) 4 h
Benzene 71-43-2	> 2000 mg/kg (Rat)	> 5000 mg/kg (Rabbit)	> 20 mg/l (Rat) 4 h
Cyclohexane 110-82-7	> 5000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	13.9 mg/L (Rat) 4 h
Octane 111-65-9	-	-	118 g/m³ (Rat) 4 h
1,2,3-trimethylbenzene 526-73-8	-	-	-
Naphthalene 91-20-3	490 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 340 mg/m³ (Rat) 1 h

Delayed and immediate effects as well as chronic effects from short and long-term exposure

NAPHTHAS: In a large epidemiological study on over 15,000 employees at several petroleum refineries and amongst residents located near these refineries, no increased risk of kidney cancer was observed in association with gasoline exposures (a similar material). In a similar study, no increased risk of kidney cancer was observed among petroleum refinery workers, but there was a slight trend in the incidence of kidney cancers among service station employees, especially after a 30-year latency period. Altered mental state, drowsiness, peripheral motor neuropathy, irreversible brain damage (so-called Petrol Sniffer's Encephalopathy), delirium, seizures, and sudden death have been reported from repeated overexposure to some hydrocarbon solvents, naphthas, and gasoline.

ISOPARAFFINS: Studies in laboratory animals have shown that long-term exposure to similar materials (isoparaffins) can cause kidney damage and kidney cancer in male laboratory rats. However, in-depth research indicates that these findings are unique to the male rat, and that these effects are not relevant to humans.

C9 AROMATIC HYDROCARBONS: A developmental inhalation study was conducted in laboratory mice. Increased implantation losses, reduced fetal weights, delayed ossification and an increased incidence of cleft palate were observed at the highest exposure level (1,500 ppm). This exposure level was extremely toxic to pregnant female mice (44% mortality). Reduced fetal body weights were also observed at 500 ppm. A multi-generation reproduction inhalation study was conducted in laboratory rats. Reductions in pup weights, pup weight gain, litter size, and pup survival were observed at 1,500 ppm, an exposure level at which significant maternal toxicity was observed. Reduced pup weight gain was also observed at 500 ppm.

PENTANES: Studies of pentane isomers in laboratory animals indicate exposure to extremely high levels (roughly 10 vol.%) may induce cardiac arrhythmias (irregular heartbeats) which may be serious or fatal.

BUTANES: Studies in laboratory animals indicate exposure to extremely high levels of butanes (1-10 or higher vol.% in air) may cause cardiac arrhythmias (irregular heartbeats) which may be serious or fatal.

TOLUENE: Case studies of persons abusing toluene suggest isolated incidences of adverse effects on the fetus including birth defects. Abuse of toluene at high concentrations (e.g., glue sniffing and solvent abuse) has been associated with adverse effects on the liver, kidney and nervous system, and can cause CNS depression, cardiac arrhythmias, and death. Studies of workers indicate longterm exposure may be related to impaired color vision and hearing. Some studies of workers suggest longterm exposure may be related to neurobehavioral and cognitive changes. Some of these effects have been observed in laboratory animals following repeated exposure to high levels of toluene. Several studies of workers suggest longterm exposure may be related to small increases in spontaneous abortions and changes in some gonadotropic hormones. However, the weight of evidence does not indicate toluene is a reproductive hazard to humans. Studies in laboratory animals indicate some changes in reproductive organs following high levels of exposure, but no significant effects on mating performance or reproduction were observed. Case studies of persons abusing toluene suggest isolated incidences of adverse effects on the fetus including birth defects. Findings in laboratory animals have been largely negative. Positive findings include small increases in minor skeletal and visceral malformations and developmental delays following very high levels of maternal exposure. Studies of workers indicate long-term exposure may be related to effects on the liver, kidney and blood, but these appear to be limited to changes in serum enzymes and decreased leukocyte counts. Adverse effects on the liver, kidney, thymus and nervous system were observed in animal studies following very high levels of exposure. The relevance of these findings to humans is not clear at this time.

XYLENES, ALL ISOMERS: Overexposure to xylene may cause upper respiratory tract irritation, headache, cyanosis, blood serum changes, nervous system damage and narcosis. Effects may be increased by the use of alcoholic beverages. Evidence of liver and kidney impairment were reported in workers recovering from a gross overexposure. Effects from Prolonged or Repeated Exposure: Impaired neurological function was reported

in workers exposed to solvents including xylene. Studies in laboratory animals have shown evidence of impaired hearing following high levels of exposure. Studies in laboratory animals suggest some changes in reproductive organs following high levels of exposure but no significant effects on reproduction were observed. Studies in laboratory animals indicate skeletal and visceral malformations, developmental delays, and increased fetal resorptions following extremely high levels of maternal exposure with evidence of maternal toxicity. The relevance of these observations to humans is not clear at this time. Adverse effects on the liver, kidney, bone marrow (changes in blood cell parameters) were observed in laboratory animals following high levels of exposure. The relevance of these observations to humans is not clear at this time.

1,2,4-TRIMETHYLBENZENE: The following information pertains to a mixture of C9 aromatic hydrocarbons, over 40% of which was composed of 1,2,4-trimethylbenzene. A developmental inhalation study was conducted in laboratory mice. Increased implantation losses, reduced fetal weights, delayed ossification and an increased incidence of cleft palate were observed at the highest exposure level (1,500 ppm). This exposure level was extremely toxic to pregnant female mice (44% mortality). Reduced fetal body weights were also observed at 500 ppm. A multi-generation reproduction inhalation study was conducted in laboratory rats. Reductions in pup weights, pup weight gain, litter size, and pup survival were observed at 1,500 ppm, an exposure level at which significant maternal toxicity was observed. Reduced pup weight gain was also observed at 500 ppm. Embryotoxicity has been reported in studies of laboratory animals. Adverse effects included increased implantation losses, reduced fetal weights, delayed ossification and an increased incidence of cleft palate.<n><n>

N-HEXANE: Long-term or repeated exposure to n-hexane can cause peripheral nerve damage. Initial symptoms are numbness of the fingers and toes. Also, motor weakness can occur in the digits, but may also involve muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for several months to a year after the beginning of exposure. Testicular atrophy and partial to full loss of the germ cell line were observed in sub-chronic high-dose inhalation studies of laboratory rodents. These effects appeared irreversible. Rodent reproduction studies have shown evidence of reduced fetal weight but no frank malformations.

CUMENE: Overexposure to cumene may cause upper respiratory tract irritation and CNS depression. Studies in laboratory animals indicate evidence of respiratory tract hyperplasia, and adverse effects on the liver, kidney and adrenal glands following high level exposure. The relevance of these findings to humans is not clear at this time. Findings from lifetime laboratory rodent inhalation studies were as follows: In F344/N rats: an increased incidence of renal carcinomas and adenomas, respiratory epithelial adenomas, and interstitial cell adenomas of the testes. In B6C3F1 mice: an increased incidence of carcinomas and adenomas of the bronchi and lung, liver neoplasms, hemangiosarcomas of the spleen, and adenomas of the thyroid.

ETHYLBENZENE: Findings from a 2-year inhalation study in rodents conducted by NTP were as follows: Effects were observed only at the highest exposure level (750 ppm). At this level the incidence of renal tumors was elevated in male rats (tubular carcinomas) and female rats (tubular adenomas). The incidence of tumors was also elevated in male mice (alveolar and bronchiolar carcinomas) and female mice (hepatocellular carcinomas). IARC has classified ethyl benzene as "possibly carcinogenic to humans" (Group 2B). Studies in laboratory animals indicate some evidence of post-implantation deaths following high levels of maternal exposure. The relevance of these findings to humans is not clear at this time. Studies in laboratory animals indicate limited evidence of renal malformations, resorptions, and developmental delays following high levels of maternal exposure with evidence of maternal toxicity. The relevance of these findings to humans is not clear at this time. Studies in laboratory animals have demonstrated evidence of ototoxicity (hearing loss) following exposure levels as low as 300 ppm for 5 days. Studies in laboratory animals indicate some evidence of adverse effects on the liver, kidney, thyroid, and pituitary gland.

BENZENE: Studies of workers exposed to benzene show clear evidence that overexposure can cause cancer and other diseases of the blood forming organs including Acute

Myelogenous Leukemia (AML), and Aplastic Anemia (AA), an often fatal disease. Some studies suggest overexposure to benzene may also be associated with Myelodysplastic Syndrome (MDS). Findings from a case control study of workers exposed to benzene was reported during the 2009 Benzene Symposium in Munich included an increase in Acute Myeloid Leukemias and Non-Hodgkins Lymphoid Neoplasms (NHLN) of the subtype follicular lymphoma (FL) in some occupational categories. Some studies of workers exposed to benzene have shown an association with increased rates of chromosome aberrations in circulating lymphocytes. One study of women workers exposed to benzene suggested a weak association with irregular menstruation. However, other studies of workers exposed to benzene have not demonstrated clear evidence of an effect on fertility or reproductive outcome in humans. Benzene can cross the placenta and affect the developing fetus. Cases of AA have been reported in the offspring of persons severely overexposed to benzene. Studies in laboratory animals indicate that prolonged, repeated exposure to high levels of benzene vapor can cause bone marrow suppression and cancer in multiple organ systems. Studies in laboratory animals show evidence of adverse effects on male reproductive organs following high levels of exposure but no significant effects on reproduction have been observed. Embryotoxicity has been reported in studies of laboratory animals but effects were limited to reduced fetal weight and minor skeletal variations. Benzene has been classified as a proven human carcinogen by OSHA and a Group 1 (Carcinogenic to Humans) material by IARC. The current proposed IARC classification for benzene is summarized as follows: Sufficient evidence for Acute Myeloid Leukemia; limited evidence for Acute Lymphatic Leukemia, Chronic Lymphatic Leukemia, Non-Hodgkin Lymphoma, and Multiple Myeloma.

NAPHTHALENE: Severe jaundice, neurotoxicity (kernicterus) and fatalities have been reported in young children and infants as a result of hemolytic anemia from overexposure to naphthalene. Persons with glucose 6-phosphate dehydrogenase (G6PD) deficiency are more prone to the hemolytic effects of naphthalene. Adverse effects on the kidney have been reported in persons overexposed to naphthalene but these effects are believed to be a consequence of hemolytic anemia, and not a direct effect. Hemolytic anemia has been observed in laboratory animals exposed to naphthalene. Laboratory rodents exposed to naphthalene vapor for 2 years (lifetime studies) developed non-neoplastic and neoplastic tumors and inflammatory lesions of the nasal and respiratory tract. Cataracts and other adverse effects on the eye have been observed in laboratory animals exposed to high levels of naphthalene. Findings from a large number of bacterial and mammalian cell mutation assays have been negative. A few studies have shown chromosomal effects (elevated levels of Sister Chromatid Exchange or chromosomal aberrations) in vitro. Naphthalene has been classified as Possibly Carcinogenic to Humans (2B) by IARC, based on findings from studies in laboratory animals.

CARBON MONOXIDE: is a chemical asphyxiant with no warning properties (such as odor). At 400-500 ppm for 1 hour headache and dyspnea may occur. If activity is increased, symptoms of overexposure may include nausea, irritability, increased respiration, tinnitus, sweating, chest pain, confusion, impaired judgement, dizziness, weakness, drowsiness, ataxia, irregular heart beat, cyanosis and pallor. Levels in excess of 1000 ppm can result in collapse, loss of conciousness, respiratory failure and death. Extremely high concentrations (12,800 ppm) can cause immediate unconsciousness and death in 1-3 minutes. Repeated anoxia can lead to central nervous system damage and peripheral neuropathy, with loss of sensation in the fingers, amnesia, and mental deterioration and possible congestive heart failure. Damage may also occur to the fetus, lung, liver, kidney, spleen, cardiovascular system and other organs.

WHOLLY-VAPORIZED UNLEADED GASOLINE: Lifetime exposure to wholly vaporized unleaded gasoline produced an increased incidence of liver tumors in female mice exposed to the highest exposure concentration (2056 ppm) and α-2 urinary globulin-mediated kidney tumors in male rats. No exposure-related tumors were observed in male mice or female rats. The male-specific rat kidney tumors are not considered relevant to human health. Mice receiving lifetime repeated skin application of various petroleum naphthas exhibited an irritation-dependent increased incidence of skin tumors. Additional studies suggest that these tumors occur through a mechanism that may not be relevant to human health. Epidemiological data from over 18,000 petroleum marketing and distribution workers

showed no increased risk of leukemia, multiple myeloma, or kidney cancer resulting from gasoline exposure. Unleaded gasoline has been identified as possibly carcinogenic to humans (2B) by the International Agency for Research on Cancer (IARC).

COMBUSTION ENGINE EXHAUST: Chronic inhalation studies of gasoline engine exhaust in mice, rats and hamsters did not produce any carcinogenic effects. Condensates/extracts of gasoline engine exhaust produced an increase in tumors compared to controls when testing by skin painting, subcutaneous injection, intratracheal instillation or implantation into the lungs. Gasoline exhaust has been classified as possibly carcinogenic to humans (2B) by the International Agency for Research on Cancer (IARC).

Adverse effects related to the physical, chemical and toxicological characteristics

Signs and Symptoms Irritating to the skin and mucous membranes. Symptoms may include redness, itching, and inflammation. May cause nausea, vomiting, diarrhea, and signs of nervous system depression: headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue. Aspiration hazard. May cause coughing, chest pains, shortness of breath, pulmonary edema and/or chemical pneumonitis. Repeated or prolonged skin contact may cause drying, reddening, itching and cracking.

Sensitization Not expected to be a skin or respiratory sensitizer.

Mutagenic effects May cause genetic defects.

Carcinogenicity May cause cancer.

Cancer designations are listed in the table below

Name	ACGIH (Class)	IARC (Class)	NTP	OSHA
Gasoline 86290-81-5	Confirmed animal carcinogen (A3)	Possible human carcinogen (2B)	Not Listed	Not Listed
Heptane (mixed isomers) 142-82-5	Not Listed	Not Listed	Not Listed	Not Listed
Pentane (mixed isomers) 78-78-4	Not Listed	Not Listed	Not Listed	Not Listed
Butane (mixed isomers) 106-97-8	Not Listed	Not Listed	Not Listed	Not Listed
Hexane Isomers (other than n-Hexane) 107-83-5	Not Listed	Not Listed	Not Listed	Not Listed
Toluene 108-88-3	Not Classifiable (A4)	Not Classifiable (3)	Not Listed	Not Listed
Xylene (mixed isomers) 1330-20-7	Not classifiable (A4)	Not classifiable (3)	Not Listed	Not Listed
n-Hexane 110-54-3	Not Listed	Not Listed	Not Listed	Not Listed
Cumene 98-82-8	Not listed	Possible human carcinogen (2B)	Reasonably anticipated to be a human carcinogen	Not listed
1,2,4 Trimethylbenzene 95-63-6	Not Listed	Not Listed	Not Listed	Not Listed
Ethylbenzene 100-41-4	Confirmed animal carcinogen (A3)	Possible human carcinogen (2B)	Not Listed	Not Listed
Benzene 71-43-2	Confirmed human carcinogen (A1)	Carcinogenic to humans (1)	Known to be human carcinogen	Known carcinogen
Cyclohexane 110-82-7	Not Listed	Not Listed	Not Listed	Not Listed
Octane 111-65-9	Not Listed	Not Listed	Not Listed	Not Listed
1,2,3-trimethylbenzene 526-73-8	Not Listed	Not Listed	Not Listed	Not Listed
Naphthalene 91-20-3	Confirmed animal carcinogen (A3)	Possible human carcinogen (2B)	Reasonably anticipated to be a human carcinogen	Not Listed

Reproductive toxicity Suspected of damaging fertility or the unborn child.

Specific Target Organ Toxicity (STOT) - single exposure Respiratory system. Central nervous system.

Specific Target Organ Toxicity (STOT) - repeated exposure Not classified.

Aspiration hazard May be fatal if swallowed or vomited and enters airways.

12. ECOLOGICAL INFORMATION

Ecotoxicity This product should be considered toxic to aquatic organisms, with the potential to cause long lasting adverse effects in the aquatic environment.

Name	Algae/aquatic plants	Fish	Toxicity to Microorganisms	Crustacea
Gasoline 86290-81-5	72-hr EC50 = 56 mg/l Algae	96-hr LC50 = 11 mg/l Rainbow trout (static)	-	48-hr LC50 = 7.6 mg/l Daphnia magna
Heptane (mixed isomers) 142-82-5	-	96-hr LC50 = 375 mg/L Tilapia	-	-
Pentane (mixed isomers) 78-78-4	-	96-hr LC50 = 3.1 mg/L Rainbow trout	-	48-hr EC50 = >1 - <10 mg/L Daphnia magna
Butane (mixed isomers) 106-97-8	-	-	-	-
Hexane Isomers (other than n-Hexane) 107-83-5	-	-	-	-
Toluene 108-88-3	72-hr EC50 = 12.5 mg/l Algae	96-hr LC50 <= 10 mg/l Rainbow trout	-	48-hr EC50 = 5.46-9.83 mg/l Daphnia magna 48-hr EC50 = 11.5 mg/l Daphnia magna (Static)
Xylene (mixed isomers) 1330-20-7	72-hr EC50 = 11 mg/l Algae	96-hr LC50 = 8 mg/l Rainbow trout	-	48-hr LC50 = 3.82 mg/l Daphnia magna
n-Hexane 110-54-3	-	96-hr LC50 = 2.5 mg/l Fathead minnow	-	-
Cumene 98-82-8	72-hr EC50 = 2.6 mg/l Algae	96-hr LC50 = 6.04-6.61 mg/l Fathead minnow (Flow-through) 96-hr LC50 = 2.7 mg/l Rainbow trout (semi-static)	-	48-hr EC50 = 7.9-14.1 mg/l Daphnia magna (static)
1,2,4 Trimethylbenzene 95-63-6	-	96-hr LC50 = 7.19-8.28 mg/l Fathead minnow (flow-through)	-	48-hr EC50 = 6.14 mg/L Daphnia magna
Ethylbenzene 100-41-4	72-hr EC50 = 1.7-7.6 mg/l Algae	96-hr LC50 = 4 mg/L Rainbow trout	-	48-hr EC50 = 1-4 mg/L Daphnia magna
Benzene 71-43-2	72-hr EC50 = 29 mg/l Algae	96-hr LC50 = 5.3 mg/l Rainbow trout (flow-through)	-	48-hr EC50 = 8.76-15.6 mg/l Daphnia magna (Static)
Cyclohexane 110-82-7	72-hr EC50 = 500 mg/l Algae	96-hr LC50 = 3.96-5.18 mg/l Fathead minnow	-	48-hr EC50 = 1.7-3.5 mg/L Bay shrimp
Octane 111-65-9	-	-	-	48-hr LC50 = 0.38 mg/l Daphnia magna
1,2,3-trimethylbenzene 526-73-8	-	96-hr LC50 = 7.72 mg/l Fathead Minnow (flow-through)	-	-
Naphthalene 91-20-3	-	96-hr LC50 = 0.91-2.82 mg/l Rainbow trout (static) 96-hr LC50 = 1.99 mg/l Fathead minnow (static)	-	48-hr LC50 = 1.6 mg/l Daphnia magna

Persistence and degradability Expected to be inherently biodegradable. The presence of ethanol in this product may impede the biodegradation of benzene, toluene, ethylbenzene and xylene in groundwater, resulting in elongated plumes of these constituents.

Bioaccumulation Has the potential to bioaccumulate.

Mobility in soil May partition into air, soil and water.

Other adverse effects No information available.

13. DISPOSAL CONSIDERATIONS

Description of Waste Residues
This material may be a flammable liquid waste.

Safe Handling of Wastes
Handle in accordance with applicable local, state, and federal regulations. Use personal protection measures as required. Use appropriate grounding and bonding practices. Use only non-sparking tools. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. No smoking.

Disposal of Wastes / Methods of Disposal
The user is responsible for determining if any discarded material is a hazardous waste (40 CFR 262.11). Dispose of in accordance with federal, state and local regulations.

Methods of Contaminated Packaging Disposal
Empty containers should be completely drained and then discarded or recycled, if possible. Do not cut, drill, grind or weld on empty containers since explosive residues may be present. Dispose of in accordance with federal, state and local regulations.

14. TRANSPORT INFORMATION

DOT (49 CFR 172.101):

UN Proper Shipping Name:	Gasoline
UN/Identification No:	UN 1203
Transport Hazard Class(es):	3
Packing Group:	II

TDG (Canada):

UN Proper Shipping Name:	Gasoline
UN/Identification No:	UN 1203
Transport Hazard Class(es):	3
Packing Group:	II

15. REGULATORY INFORMATION

US Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product does not contain any component(s) included on EPA's Extremely Hazardous Substance (EHS) List.

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Gasoline	NA
Heptane (mixed isomers)	NA
Pentane (mixed isomers)	NA
Butane (mixed isomers)	NA
Hexane Isomers (other than n-Hexane)	NA
Toluene	NA
Xylene (mixed isomers)	NA

n-Hexane	NA
Cumene	NA
1,2,4 Trimethylbenzene	NA
Ethylbenzene	NA
Benzene	NA
Cyclohexane	NA
Octane	NA
1,2,3-trimethylbenzene	NA
Naphthalene	NA

SARA Section 304: This product may contain component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	Hazardous Substances RQs
Gasoline	NA
Heptane (mixed isomers)	NA
Pentane (mixed isomers)	NA
Butane (mixed isomers)	NA
Hexane Isomers (other than n-Hexane)	NA
Toluene	1000 lb final RQ 454 kg final RQ
Xylene (mixed isomers)	100 lb final RQ 45.4 kg final RQ
n-Hexane	5000 lb final RQ 2270 kg final RQ
Cumene	5000 lb final RQ 2270 kg final RQ
1,2,4 Trimethylbenzene	NA
Ethylbenzene	1000 lb final RQ 454 kg final RQ
Benzene	10 lb final RQ 4.54 kg final RQ
Cyclohexane	1000 lb final RQ 454 kg final RQ
Octane	NA
1,2,3-trimethylbenzene	NA
Naphthalene	100 lb final RQ 45.4 kg final RQ

SARA: The following EPA hazard categories apply to this product:

Acute Health Hazard
Chronic Health Hazard
Fire Hazard

SARA Section 313: This product may contain component(s), which if in exceedance of the de minimus threshold, may be subject to the reporting requirements of SARA Title III Section 313 Toxic Release Reporting (Form R).

Name	CERCLA/SARA 313 Emission reporting:
Gasoline	None
Heptane (mixed isomers)	None
Pentane (mixed isomers)	None
Butane (mixed isomers)	None
Hexane Isomers (other than n-Hexane)	None
Toluene	1.0 % de minimis concentration
Xylene (mixed isomers)	1.0 % de minimis concentration
n-Hexane	1.0 % de minimis concentration
Cumene	1.0 % de minimis concentration

1,2,4 Trimethylbenzene	1.0 % de minimis concentration
Ethylbenzene	0.1 % de minimis concentration
Benzene	0.1 % de minimis concentration
Cyclohexane	1.0 % de minimis concentration
Octane	None
1,2,3-trimethylbenzene	None
Naphthalene	0.1 % de minimis concentration

State and Community Right-To-Know Regulations:
The following component(s) of this material are identified on the regulatory lists below:

Gasoline

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 0957
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Not Listed
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Carcinogen; Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 0957 TPQ: 10000 lb (Under N.J.A.C. 7:1G, environmental hazardous substances in mixtures such as gasoline or new and used petroleum oil may be reported under these categories)
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Heptane (mixed isomers)

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1339
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Pentane (mixed isomers)

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1064
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Not Listed
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed

California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - fourth degree
New Jersey - Environmental Hazardous Substances List:	SN 1064 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Butane (mixed isomers)

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 0273
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - fourth degree
New Jersey - Environmental Hazardous Substances List:	SN 0273 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Hexane Isomers (other than n-Hexane)

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1285
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Not Listed
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Toluene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Developmental toxicity, initial date 1/1/91 Female reproductive toxicity, initial date 8/7/09
New Jersey Right-To-Know:	SN 1866
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic (skin); Flammable (skin)
Michigan Critical Materials Register List:	100 lb Annual usage threshold
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed

New Jersey - Special Hazardous Substances:	Flammable - third degree; Teratogen
New Jersey - Environmental Hazardous Substances List:	SN 1866 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1000 lb RQ (air); 1 lb RQ (land/water)

Xylene (mixed isomers)

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 2014
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic (skin); Flammable (skin)
Michigan Critical Materials Register List:	100 lb Annual usage threshold all isomers
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 2014 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1000 lb RQ (air); 1 lb RQ (land/water)

n-Hexane

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1340
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 1340 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1 lb RQ (air); 1 lb RQ (land/water)

Cumene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Carcinogen, initial date 4/6/10
New Jersey Right-To-Know:	SN 0542
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic (skin); Flammable (skin)
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 0542 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present

New York - Reporting of Releases Part 597 - List of Hazardous Substances:	5000 lb RQ (air); 1 lb RQ (land/water)

1,2,4 Trimethylbenzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1929
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Ethylbenzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Carcinogen, initial date 6/11/04
New Jersey Right-To-Know:	SN 0851
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Carcinogen; flammable - Third degree
New Jersey - Environmental Hazardous Substances List:	SN 0851 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1000 lb RQ (air); 1 lb RQ (land/water)

Benzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Carcinogen, initial date 2/27/87 Developmental toxicity, initial date 12/26/97 Male reproductive toxicity, initial date 12/26/97
New Jersey Right-To-Know:	SN 0197
Pennsylvania Right-To-Know:	Environmental hazard; Special hazardous substance
Massachusetts Right-To Know:	Carcinogen; Extraordinarily hazardous
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic (skin); Flammable (skin); Carcinogen (skin)
Michigan Critical Materials Register List:	100 lb Annual usage threshold
Massachusetts Extraordinarily Hazardous Substances:	Carcinogen; Extraordinarily hazardous
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Present
New Jersey - Special Hazardous Substances:	Carcinogen; Flammable - third degree; Mutagen
New Jersey - Environmental Hazardous Substances List:	SN 0197 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	10 lb RQ (air); 1 lb RQ (land/water)

Cyclohexane

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 0565
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 0565 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1000 lb RQ (air); 1 lb RQ (land/water)

Octane

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1434
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

1,2,3-trimethylbenzene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1929
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed

Naphthalene

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Carcinogen, initial date 4/19/02
New Jersey Right-To-Know:	SN 1322 SN 3758

Pennsylvania Right-To-Know:	Environmental hazard Present (particulate)
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Carcinogen
New Jersey - Environmental Hazardous Substances List:	SN 1322 TPQ: 500 lb (Reportable at the de minimis quantity of >0.1%)
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	100 lb RQ (air); 1 lb RQ (land/water)

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Canadian Regulatory Information: This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the (M)SDS contains all the information required by the Controlled Products Regulations.

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Gasoline	B2,D2A,D2B	0.1%
Heptane (mixed isomers)	B2,D2B	1%
Pentane (mixed isomers)	B2	1%
Butane (mixed isomers)	A,B1	1%
Hexane Isomers (other than n-Hexane)	B2	1%
Toluene	B2,D2A,D2B	0.1%
Xylene (mixed isomers)	B2,D2A,D2B	m-, o-isomers 1.0%; p-isomer 0.1%
n-Hexane	B2,D2A,D2B	1%
Cumene	B2,D2A	0.1%
1,2,4 Trimethylbenzene	B3,D2B	1%
Ethylbenzene	B2,D2A,D2B	0.1%
Benzene	B2,D2A,D2B	0.1%
Cyclohexane	B2,D2B	1%
Octane	B2,D2B	1%
1,2,3-trimethylbenzene	B3	1%
Naphthalene	B4,D2A	0.1%



Note: Not applicable.

16. OTHER INFORMATION

Prepared By Toxicology and Product Safety

Revision Date: 06/01/2016

Revision Note:

Revised Sections

The following sections (§) have been updated:
1. IDENTIFICATION
2. HAZARD IDENTIFICATION
3. COMPOSITION/INFORMATION ON INGREDIENTS
4. FIRST AID MEASURES
6. ACCIDENTAL RELEASE MEASURES
7. HANDLING AND STORAGE
8. EXPOSURE CONTROLS/PERSONAL PROTECTION
9. PHYSICAL AND CHEMICAL PROPERTIES
11. TOXICOLOGICAL INFORMATION
12. ECOLOGICAL INFORMATION
15. REGULATORY INFORMATION

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is intended as guidance for safe handling, use, processing, storage, transportation, accidental release, clean-up and disposal and is not considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

SAFETY DATA SHEET

Helium

Section 1. Identification

GHS product identifier : Helium

Chemical name : Helium

Other means of identification : helium (dot); Helium-4; He; o-Helium; UN 1046

Product use : Synthetic/Analytical chemistry.

Synonym : helium (dot); Helium-4; He; o-Helium; UN 1046

SDS # : 001025

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Emergency telephone number (with hours of operation) : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : GASES UNDER PRESSURE - Compressed gas

GHS label elements

Hazard pictograms :



Signal word : Warning

Hazard statements : Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction.

Prevention : Use and store only outdoors or in a well ventilated place.

Response : Not applicable.

Storage : Protect from sunlight. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Disposal : Not applicable.

Hazards not otherwise classified : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

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Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : Helium

Other means of identification : helium (dot); Helium-4; He; o-Helium; UN 1046

CAS number/other identifiers

CAS number : 7440-59-7

Product code : 001025

Ingredient name	%	CAS number
Helium	100	7440-59-7

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : No known significant effects or critical hazards.

Skin contact : Contact with rapidly expanding gas may cause burns or frostbite.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

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Section 4. First aid measures

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

Hazardous thermal decomposition products : No specific data.

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

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Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Helium	Oxygen Depletion [Asphyxiant]

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

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Section 8. Exposure controls/personal protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [Compressed gas.]

Color : Colorless.

Molecular weight : 4 g/mole

Molecular formula : He

Boiling/condensation point : -268.9°C (-452°F)

Melting/freezing point : -272.2°C (-458°F)

Critical temperature : -267.9°C (-450.2°F)

Odor : Odorless.

Odor threshold : Not available.

pH : Not available.

Flash point : [Product does not sustain combustion.]

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : Not available.

Vapor density : 0.14 (Air = 1) Liquid Density@BP: 7.8 lb/ft3 (125 kg/m3)

Specific Volume (ft ^{3}/lb) : 96.1538

Gas Density (lb/ft ^{3}) : 0.0104

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : Not available.

Partition coefficient: n-octanol/water : 0.28

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

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Section 9. Physical and chemical properties

SADT : Not available.

Viscosity : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

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Section 11. Toxicological information

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : No known significant effects or critical hazards.

Skin contact : Contact with rapidly expanding gas may cause burns or frostbite.

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

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Section 12. Ecological information

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Helium	0.28	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1046	UN1046	UN1046	UN1046	UN1046
UN proper shipping name	HELIUM, COMPRESSED	HELIUM, COMPRESSED	HELIUM, COMPRESSED	HELIUM, COMPRESSED	HELIUM, COMPRESSED
Transport hazard class(es)	2.2 	2.2 	2.2 	2.2 	2.2 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	**Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: 75 kg **Cargo aircraft** Quantity limitation: 150 kg	**Explosive Limit and Limited Quantity Index** 0.125 **Passenger Carrying Road or Rail Index** 75	-	-	**Passenger and Cargo Aircraft**Quantity limitation: 75 kg **Cargo Aircraft Only** Quantity limitation: 150 kg

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

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Section 14. Transport information

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Sudden release of pressure

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Helium	100	No.	Yes.	No.	No.	No.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

Canada inventory : This material is listed or exempted.

International regulations

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Section 15. Regulatory information

International lists : **Australia inventory (AICS)**: This material is listed or exempted.
China inventory (IECSC): This material is listed or exempted.
Japan inventory: Not determined.
Korea inventory: This material is listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): This material is listed or exempted.
Philippines inventory (PICCS): This material is listed or exempted.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

Canada

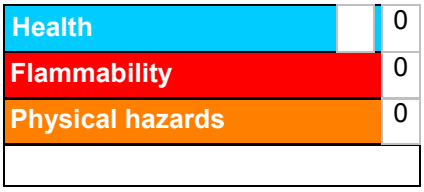
WHMIS (Canada) : Class A: Compressed gas.

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is not listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class A: Compressed gas.

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



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Section 16. Other information

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of printing : 10/15/2014.

Date of issue/Date of revision : 10/15/2014.

Date of previous issue : 10/2/2014.

Version : 0.02

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United NationsACGIH – American Conference of Governmental Industrial Hygienists
AIHA – American Industrial Hygiene Association
CAS – Chemical Abstract Services
CEPA – Canadian Environmental Protection Act
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)
CFR – United States Code of Federal Regulations
CPR – Controlled Products Regulations
DSL – Domestic Substances List
GWP – Global Warming Potential
IARC – International Agency for Research on Cancer
ICAO – International Civil Aviation Organisation
Inh – Inhalation
LC – Lethal concentration
LD – Lethal dosage
NDSL – Non-Domestic Substances List
NIOSH – National Institute for Occupational Safety and Health
TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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SAFETY DATA SHEET

Version 5.7
Revision Date 11/03/2015
Print Date 02/18/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Heptane

Product Number : 246654
Brand : Sigma-Aldrich
Index-No. : 601-008-00-2

CAS-No. : 142-82-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Skin irritation (Category 2), H315
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Aspiration hazard (Category 1), H304
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H304 May be fatal if swallowed and enters airways.
H315 Causes skin irritation.
H336 May cause drowsiness or dizziness.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.

P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	C_7H_{16}
Molecular weight	:	100.20 g/mol
CAS-No.	:	142-82-5
EC-No.	:	205-563-8
Index-No.	:	601-008-00-2
Registration number	:	01-2119457603-38-XXXX

Hazardous components

Component	Classification	Concentration
Heptane		
	Flam. Liq. 2; Skin Irrit. 2; STOT SE 3; Asp. Tox. 1; Aquatic Acute 1; Aquatic Chronic 1; H225, H304, H315, H336, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Flash back possible over considerable distance.

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion.Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store under inert gas. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Heptane	142-82-5	TWA	85.000000 ppm 350.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		C	440.000000 ppm 1,800.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
	Remarks	15 minute ceiling value		
		TWA	500.000000 ppm 2,000.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	400.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation		
		STEL	500.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation		
		TWA	400.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation		
		STEL	500.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation		
		TWA	400 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation		
		STEL	500 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 480 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm
Break through time: 65 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -91 °C (-132 °F)
f)	Initial boiling point and boiling range	98 °C (208 °F)
g)	Flash point	-3.99 °C (24.82 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 7 %(V) Lower explosion limit: 1.1 %(V)
k)	Vapour pressure	110.7 hPa (83.0 mmHg) at 37.7 °C (99.9 °F) 53.3 hPa (40.0 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available

m)	Relative density	0.684 g/mL at 25 °C (77 °F)
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	log Pow: > 3.000
p)	Auto-ignition temperature	223.0 °C (433.4 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

LC50 Inhalation - Rat - 4 h - 103,000 mg/m3

Inhalation: Irritating to respiratory system.

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
May be fatal if swallowed and enters airways.

Additional Information
RTECS: MI7700000

Prolonged or repeated exposure to skin causes defatting and dermatitis., Central nervous system depression, narcosis, Damage to the lungs.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Carassius auratus (goldfish) - 4 mg/l - 24.0 h
	LC50 - Tilapia mossambica - 375 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 1.50 mg/l - 48 h

12.2 Persistence and degradability

Ratio BOD/ThBOD	3.5 %

12.3 Bioaccumulative potential
Indication of bioaccumulation.

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

Do not empty into drains. Avoid release to the environment.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1206 Class: 3 Packing group: II
Proper shipping name: Heptanes
Reportable Quantity (RQ):
Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG
UN number: 1206 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: HEPTANES
Marine pollutant:yes

IATA
UN number: 1206 Class: 3 Packing group: II
Proper shipping name: Heptanes

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Heptane	142-82-5	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Heptane	142-82-5	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Heptane	142-82-5	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity

Asp. Tox.	Aspiration hazard
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H336	May cause drowsiness or dizziness.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
Skin Irrit.	Skin irritation

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.7 Revision Date: 11/03/2015 Print Date: 02/18/2016

SAFETY DATA SHEET

Version 3.8
Revision Date 04/24/2015
Print Date 04/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Hexachlorobenzene

Product Number : 171050
Brand : Aldrich
Index-No. : 602-065-00-6

CAS-No. : 118-74-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Carcinogenicity (Category 1B), H350
Specific target organ toxicity - repeated exposure, Oral (Category 1), H372
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H350 May cause cancer.
H372 Causes damage to organs through prolonged or repeated exposure if swallowed.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.

P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P281	Use personal protective equipment as required.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	C_6Cl_6
Molecular weight	:	284.78 g/mol
CAS-No.	:	118-74-1
EC-No.	:	204-273-9
Index-No.	:	602-065-00-6

Hazardous components

Component	Classification	Concentration
Hexachlorobenzene		
	Carc. 1B; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H350, H372, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Hexachlorobenzene	118-74-1	TWA	0.002000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Porphyrin effects Skin damage Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: white
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 227 - 229 °C (441 - 444 °F) - lit.
f)	Initial boiling point and boiling range	323 - 326 °C (613 - 619 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available

m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 10,000 mg/kg

LD50 Oral - Mouse - 4,000 mg/kg

LD50 Oral - Cat - 1,700 mg/kg

LD50 Oral - Rabbit - 2,600 mg/kg

LD50 Oral - Guinea pig - > 3,000 mg/kg

LD50 Oral - Quail - > 6,400 mg/kg

LD50 Oral - Mammal - > 5,000 mg/kg
Remarks: Behavioral:Somnolence (general depressed activity). Behavioral:Change in motor activity (specific assay).

LC50 Inhalation - Rat - 3,600 mg/m3

LC50 Inhalation - Mouse - 4,000 mg/m3

LC50 Inhalation - Cat - 1,600 mg/m3

LC50 Inhalation - Rabbit - 1,800 mg/m3

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
Causes photosensitivity. Exposure to light can result in allergic reactions resulting in dermatologic lesions, which can vary from sunburnlike responses to edematous, vesiculated lesions, or bullae

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Hexachlorobenzene)
NTP:	Reasonably anticipated to be a human carcinogen (Hexachlorobenzene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Ingestion - Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: Not available

Liver -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Lepomis macrochirus (Bluegill) - 7.6 mg/l - 96.0 h
	NOEC - Pimephales promelas (fathead minnow) - > 0.0048 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - > 0.005 mg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Bioaccumulation: Pimephales promelas (fathead minnow) - 32 d - 0.0003 mg/l

Bioconcentration factor (BCF): 22,000

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 2729 Class: 6.1 Packing group: III
Proper shipping name: Hexachlorobenzene
Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

IMDG

UN number: 2729 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: HEXACHLOROBENZENE
Marine pollutant:yes

IATA

UN number: 2729 Class: 6.1 Packing group: III
Proper shipping name: Hexachlorobenzene

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Hexachlorobenzene	118-74-1	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Hexachlorobenzene	118-74-1	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Hexachlorobenzene	118-74-1	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Hexachlorobenzene	CAS-No. 118-74-1	Revision Date 2007-09-28
WARNING: This product contains a chemical known to the	CAS-No.	Revision Date

State of California to cause birth defects or other reproductive harm. Hexachlorobenzene	118-74-1	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H350	May cause cancer.
H372	Causes damage to organs through prolonged or repeated exposure if swallowed.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	3
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.8 Revision Date: 04/24/2015 Print Date: 04/01/2016

SAFETY DATA SHEET

Issuing Date no data available **Revision Date** 29-Oct-2015 **Revision Number** 1

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier

Product Number	**019**
Product Name	**Hexavalent Chromium - 1000 mg/L, 125 mL**
Synonyms	None

Recommended use of the chemical and restrictions on use

Recommended Use	Laboratory use only
Uses advised against	No information available

Details of the supplier of the safety data sheet

Supplier	ERA a Waters Company
Supplier Address	16341 Table Mountain Parkway, Golden, CO 80403 USA
Non-Emergency Telephone Number	+1-303-431-8454
Supplier Email	sdsinfo@waters.com

Emergency telephone number

Company Emergency Phone Number	In case of EMERGENCY call CHEMTREC Day or Night Within USA and Canada: 800-424-9300 International Call Collect: +1-703-527-3887

2. HAZARDS IDENTIFICATION

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

Respiratory sensitization	Category 1
Skin sensitization	Category 1
Germ cell mutagenicity	Category 1B
Carcinogenicity	Category 1A
Reproductive Toxicity	Category 1B

GHS Label elements, including precautionary statements

Emergency Overview

Signal word **Danger**

Hazard Statements

May cause allergy or asthma symptoms or breathing difficulties if inhaled
May cause an allergic skin reaction
May cause genetic defects
May cause cancer
May damage fertility or the unborn child



Appearance Yellow **Physical state** Liquid->Liquid **Odor** Odorless

Precautionary Statements - Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Avoid breathing dust/fume/gas/mist/vapors/spray
In case of inadequate ventilation wear respiratory protection
Contaminated work clothing should not be allowed out of the workplace
Wear protective gloves
Precautionary Statements - Response
IF exposed or concerned: Get medical advice/attention
Specific treatment (see supplemental first aid instructions on this label)
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation or rash occurs: Get medical advice/attention
Wash contaminated clothing before reuse
Inhalation
IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing
If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician

Precautionary Statements - Storage
Store locked up
Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Not applicable
Unknown Toxicity
0 % of the mixture consists of ingredient(s) of unknown toxicity
Other information

Harmful to aquatic life with long lasting effects
Repeated or prolonged skin contact may cause allergic reactions with susceptible persons
Interactions with Other Chemicals
No information available.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Note: only the components contributing to the product's GHS hazard classification are listed in this section.

Synonyms None.

Chemical Name	CAS-No	Percent
Potassium Dichromate	7778-50-9	0.25

4. FIRST AID MEASURES

First aid measures

General Advice Show this safety data sheet to the doctor in attendance.
Eye contact Rinse thoroughly with plenty of water, also under the eyelids. If symptoms persist, call a physician.
Skin contact Wash with soap and water. May cause an allergic skin reaction. In the case of skin irritation or allergic reactions see a physician.
Inhalation MAY CAUSE ALLERGIC RESPIRATORY REACTION. If breathing has stopped, give artificial respiration. Get medical attention immediately. Remove to fresh air. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Seek immediate medical attention/advice.
Ingestion May produce an allergic reaction. If an allergic reaction occurs, stop use and seek medical help right away. Do NOT induce vomiting. Rinse mouth immediately and drink plenty of

water. Never give anything by mouth to an unconscious person. Call a physician or poison control center immediately.

Self-protection of the first aider Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination. Avoid contact with skin, eyes or clothing. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Use personal protective equipment as required. Wear personal protective clothing (see section 8).

Most important symptoms and effects, both acute and delayed

Most Important Symptoms and Effects Itching. Rashes. Hives. May cause allergy or asthma symptoms or breathing difficulties if inhaled. Coughing and/ or wheezing.

Indication of any immediate medical attention and special treatment needed

Notes to Physician May cause sensitization in susceptible persons. Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media

CAUTION: Use of water spray when fighting fire may be inefficient.

Specific hazards arising from the chemical

Product is or contains a sensitizer. May cause sensitization by skin contact. May cause sensitization by inhalation and skin contact.

Uniform Fire Code Sensitizer: Liquid

Hazardous Combustion Products

Carbon oxides.

Explosion Data

Sensitivity to Mechanical Impact No.

Sensitivity to Static Discharge No.

Protective equipment and precautions for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions Avoid contact with skin, eyes or clothing. Use personal protective equipment as required. Ensure adequate ventilation. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

Other Information Refer to protective measures listed in Sections 7 and 8.

Environmental precautions

Environmental precautions Refer to protective measures listed in Sections 7 and 8. Prevent further leakage or spillage if safe to do so.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Pick up and transfer to properly labeled containers. Soak up with inert absorbent material.

7. HANDLING AND STORAGE

Precautions for safe handling

Handling Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Do not eat, drink or smoke when using this product. Take off contaminated clothing and wash before reuse. Ensure adequate ventilation. In case of insufficient ventilation, wear suitable respiratory equipment.

Conditions for safe storage, including any incompatibilities

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Store locked up. Keep out of the reach of children.

Incompatible Products None known based on information supplied.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Potassium Dichromate 7778-50-9	TWA: 0.05 mg/m³ Cr	TWA: 5 µg/m³ Action Level: 2.5 µg/m³ Cr (vacated) Ceiling: 0.1 mg/m³ Ceiling: 0.1 mg/m³ CrO3 applies to any operations or sectors for which the Hexavalent Chromium standard [29 CFR 1910.1026] is stayed or is otherwise not in effect	IDLH: 15 mg/m³ Cr(VI) TWA: 0.0002 mg/m³ Cr

ACGIH TLV: American Conference of Governmental Industrial Hygienists - Threshold Limit Value OSHA PEL: Occupational Safety and Health Administration - Permissible Exposure Limits NIOSH IDLH Immediately Dangerous to Life or Health

Appropriate engineering controls

Engineering Measures Showers
Eyewash stations
Ventilation systems

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin and body protection Wear protective gloves and protective clothing.

Respiratory protection No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Wear suitable gloves and eye/face protection. Do not eat, drink or smoke when using this product. Take off contaminated clothing and wash before reuse. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical and Chemical Properties

Physical state	Liquid->Liquid		
Appearance	Yellow	**Odor**	Odorless
Color	No information available	**Odor Threshold**	No information available

Property	Values	Remarks Method
pH	5	None known
Melting / freezing point	no data available	None known
Boiling point / boiling range	no data available	None known
Flash Point	no data available	None known
Evaporation Rate	no data available	None known
Flammability (solid, gas)	no data available	None known

Flammability Limit in Air		
Upper flammability limit	no data available	
Lower flammability limit	no data available	
Vapor pressure	no data available	None known
Vapor density	no data available	None known
Specific Gravity	1	None known
Water Solubility	Soluble in water	None known
Solubility in other solvents	no data available	None known
Partition coefficient: n-octanol/water	no data available	None known
Autoignition temperature	no data available	None known
Decomposition temperature	no data available	None known
Kinematic viscosity	no data available	None known
Dynamic viscosity	no data available	None known
Explosive properties	no data available	
Oxidizing properties	no data available	

Other Information

Softening Point	no data available
Particle Size	no data available
Particle Size Distribution	

10. STABILITY AND REACTIVITY

Reactivity

no data available.

Chemical stability
Stable under recommended storage conditions.
Possibility of Hazardous Reactions
None under normal processing.
Hazardous Polymerization
Hazardous polymerization does not occur.
Conditions to avoid
None known based on information supplied.
Incompatible materials
None known based on information supplied.
Hazardous Decomposition Products
Carbon oxides.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information	.
Inhalation	May cause allergy or asthma symptoms or breathing difficulties if inhaled. Specific test data for the substance or mixture is not available. May cause sensitization in susceptible persons. (based on components).
Eye contact	Specific test data for the substance or mixture is not available.
Skin contact	Specific test data for the substance or mixture is not available. Repeated or prolonged skin contact may cause allergic reactions with susceptible persons. (based on components).
Ingestion	Specific test data for the substance or mixture is not available. May cause additional affects as listed under "Inhalation".

Component Information

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Potassium Dichromate 7778-50-9	= 25 mg/kg (Rat) = 48 mg/kg (Rat)	= 1150 mg/kg (Rabbit) = 14 mg/kg (Rabbit)	-

Information on toxicological effects

Symptoms Itching. Rashes. Hives. Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain, or flushing. Coughing and/ or wheezing.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Sensitization May cause sensitization in susceptible persons. May cause sensitization by skin contact. May cause sensitization by inhalation.

Mutagenic Effects There is no data for this product. Contains a known or suspected mutagen.

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Chemical Name	ACGIH	IARC	NTP	OSHA
Potassium Dichromate 7778-50-9	A1	Group 1	Known	X

ACGIH (American Conference of Governmental Industrial Hygienists)
A1 - Known Human Carcinogen
IARC (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
NTP (National Toxicology Program)
Known - Known Carcinogen
OSHA (Occupational Safety and Health Administration of the US Department of Labor)
X - Present

Reproductive toxicity Contains a known or suspected reproductive toxin.

STOT - single exposure No information available.

STOT - repeated exposure No information available.

Chronic toxicity No known effect based on information supplied. Prolonged exposure may cause chronic effects. Repeated contact may cause allergic reactions in very susceptible persons. Contains a known or suspected mutagen. Possible risk of irreversible effects. Contains a known or suspected carcinogen. Contains a known or suspected reproductive toxin.

Target Organ Effects Skin. Respiratory system. Eyes. May affect the genetic material in germ cells (sperm and eggs). Gastrointestinal tract (GI). Reproductive system.

Aspiration Hazard No information available.

Numerical measures of toxicity Product Information

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral)
40,000.00 mg/kg
ATEmix (inhalation-dust/mist)
20.04 mg/L

12. ECOLOGICAL INFORMATION

Ecotoxicity

Harmful to aquatic life with long lasting effects.

Chemical Name	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Daphnia Magna (Water Flea)
Potassium Dichromate 7778-50-9		96h LC50: > 139 mg/L (Cyprinus carpio) 96h LC50: 113.6 - 155.7 mg/L (Lepomis macrochirus) 96h LC50: = 320 mg/L (Lepomis macrochirus) 96h LC50: 65.6 - 137.6 mg/L (Lepomis macrochirus) 96h LC50: = 12.3 mg/L (Oncorhynchus mykiss) 96h LC50: 21.209 - 30.046 mg/L (Oryzias latipes) 96h LC50: 15.41 - 30.36 mg/L (Pimephales promelas) 96h LC50: 14 - 20.9 mg/L (Pimephales promelas) 96h LC50: 24.81 - 34.55 mg/L (Poecilia reticulata) 96h LC50: 23 - 41.2 mg/L (Poecilia reticulata) 96h LC50: = 26 mg/L (Morone saxatilis)		

Persistence and Degradability

No information available.

Bioaccumulation

No information available

Other adverse effects

No information available.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal methods This material, as supplied, is not a hazardous waste according to Federal regulations (40 CFR 261). This material could become a hazardous waste if it is mixed with or otherwise comes in contact with a hazardous waste, if chemical additions are made to this material, or if the material is processed or otherwise altered. Consult 40 CFR 261 to determine whether the altered material is a hazardous waste. Consult the appropriate state, regional, or local regulations for additional requirements.

Contaminated Packaging Dispose of contents/containers in accordance with local regulations.

This product contains one or more substances that are listed with the State of California as a hazardous waste.

Chemical Name	California Hazardous Waste
Potassium Dichromate 7778-50-9	Toxic Corrosive Ignitable

14. TRANSPORT INFORMATION

DOT Not regulated

Proper Shipping Name NON REGULATED

Hazard Class N/A

TDG Not regulated

MEX Not regulated

ICAO Not regulated

IATA Not regulated
Proper Shipping Name NON REGULATED
Special Provisions None

IMDG Not regulated
Special Provisions None
Marine Pollutant Not applicable

RID Not regulated
Special Provisions None

ADR Not regulated
Special Provisions None

ADN Not regulated

15. REGULATORY INFORMATION

International Inventories

TSCA	Complies
DSL	All components are listed either on the DSL or NDSL.
ENCS	Contact supplier for inventory compliance status
KECL	Contact supplier for inventory compliance status
PICCS	Contact supplier for inventory compliance status
AICS	Contact supplier for inventory compliance status

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical Name	CAS-No	Percent	SARA 313 - Threshold Values %
Potassium Dichromate - 7778-50-9	7778-50-9	0.25	0.1

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Potassium Dichromate 7778-50-9	10 lb	X		X

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive

Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs	RQ
Potassium Dichromate 7778-50-9	10 lb		RQ 10 lb final RQ RQ 4.54 kg final RQ

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

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International Regulations

Component	Carcinogen Status	Exposure Limits
Potassium Dichromate 7778-50-9 (0.25)	A1	Mexico: TWA 0.05 mg/m³ Mexico: TWA 0.5 mg/m³

A1 - Confirmed Human Carcinogen

Canada
WHMIS Hazard Class
Not determined

16. OTHER INFORMATION

NFPA	**Health Hazards** 2	**Flammability** 0	**Instability** 0	**Physical and Chemical Hazards** -
HMIS	**Health Hazards** 2 *	**Flammability** 0	**Physical Hazard** 0	**Personal Protection** X

Chronic Hazard Star Legend * = Chronic Health Hazard

Prepared By
Product Stewardship
23 British American Blvd.
Latham, NY 12110
1-800-572-6501

Revision Date 29-Oct-2015
Revision Note No information available

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

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End of Safety Data Sheet

SAFETY DATA SHEET

Version 6.8
Revision Date 08/28/2024
Print Date 08/29/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Indeno[1,2,3-*cd*]pyrene

Product Number : 48499
Brand : Supelco
CAS-No. : 193-39-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Carcinogenicity (Category 2), H351

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Warning

Hazard Statements
H351 Suspected of causing cancer.

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Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	$C_{22}H_{12}$
Molecular weight	:	276.33 g/mol
CAS-No.	:	193-39-5
EC-No.	:	205-893-2

Component	Classification	Concentration
Indeno[1,2,3-cd]pyrene		
	Carc. 2; H351	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

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4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid inhalation of dusts. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

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SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class
Storage class (TRGS 510): 11: Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with impervious gloves.

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm

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Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter type P3
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	163.6 °C (326.5 °F)
f)	Initial boiling point and boiling range	No data available
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	No data available

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	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
Remarks: No data available

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Serious eye damage/eye irritation
Remarks: No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Indeno[1,2,3-cd]pyrene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Indeno[1,2,3-cd]pyrene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

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12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)

Not dangerous goods

IMDG

Not dangerous goods

IATA

Not dangerous goods

Further information

Not classified as dangerous in the meaning of transport regulations.

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Indeno[1,2,3-cd]pyrene	193-39-5	100	100

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Chronic Health Hazard

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SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Indeno[1,2,3-cd]pyrene	193-39-5	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

Indeno[1,2,3-cd]pyrene	193-39-5

Pennsylvania Right To Know

Indeno[1,2,3-cd]pyrene	193-39-5

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

California Prop. 65

WARNING: This product can expose you to chemicals including Indeno[1,2,3-cd]pyrene, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Version 6.8
Revision Date 30.05.2024
Print Date 16.09.2024
GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name	:	Iron
Product Number	:	12310
Brand	:	Aldrich
REACH No.	:	01-2119462838-24-XXXX
CAS-No.	:	7439-89-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	:	Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Sigma-Aldrich Inc. 3050 SPRUCE ST ST. LOUIS MO 63103 UNITED STATES
Telephone	:	+1 314 771-5765
Fax	:	+1 800 325-5052

1.4 Emergency telephone

Emergency Phone #	:	800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Flammable solids, (Category 1)	H228: Flammable solid.
Self-heating substances and mixtures, (Category 1)	H251: Self-heating; may catch fire.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

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Pictogram	
Signal Word	Danger
Hazard Statements	
H228	Flammable solid.
H251	Self-heating; may catch fire.
Precautionary Statements	
P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P235	Keep cool.
P240	Ground and bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
Supplemental Hazard Statements	none

Reduced Labeling (<= 125 ml)

Pictogram	
Signal Word	Danger
Hazard Statements	
H251	Self-heating; may catch fire.
Precautionary Statements	
P235	Keep cool.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
Supplemental Hazard Statements	none

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Ecological information:
The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.
Toxicological information:
The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

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SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	Fe
Molecular weight	:	55,85 g/mol
CAS-No.	:	7439-89-6
EC-No.	:	231-096-4

No components need to be disclosed according to the applicable regulations.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most). Consult doctor if feeling unwell.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Iron oxides
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters

In the event of fire, wear self-contained breathing apparatus.

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5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid inhalation of dusts. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up
Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Change contaminated clothing. Wash hands after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep away from heat and sources of ignition.

Storage class
Storage class (TRGS 510): 4.2: Pyrophoric and self-heating hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

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SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

8.2 Exposure controls

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.
Recommended Filter type: Filter type P1

The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Physical state	powder
b)	Color	light gray
c)	Odor	odorless
d)	Melting point/freezing point	Melting point/range: 1.538 °C at 1.023 hPa
e)	Initial boiling point and boiling range	2.861 °C at 1.013 hPa
f)	Flammability (solid, gas)	The substance or mixture is a flammable solid with the category 1.
g)	Upper/lower flammability or explosive limits	No data available
h)	Flash point	Not applicable
i)	Autoignition temperature	The substance or mixture is classified as self heating with the category 1.

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j)	Decomposition temperature	No data available
k)	pH	Not applicable
l)	Viscosity	Viscosity, kinematic: No data available Viscosity, dynamic: No data available
m)	Water solubility	insoluble
n)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances
o)	Vapor pressure	Not applicable
p)	Density	7,87 g/cm3 at 20 °C
	Relative density	7,87 at 20 °C
q)	Relative vapor density	
r)	Particle characteristics	No data available
s)	Explosive properties	Not classified as explosive.
t)	Oxidizing properties	The substance or mixture is not classified as oxidizing.

9.2 Other safety information

Dust explosion class St1

SECTION 10: Stability and reactivity

10.1 Reactivity

Self-heating; may catch fire.
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

no information available

10.5 Incompatible materials

Strong acids

10.6 Hazardous decomposition products

In the event of fire: see section 5

The life science business of Merck operates as MilliporeSigma in the US and Canada

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 7.500 mg/kg
Remarks: (Lit.)
Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
Remarks: No skin irritation

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)
Remarks: (Lit.)

Respiratory or skin sensitization
Did not cause sensitization on laboratory animals.

Germ cell mutagenicity
Test system: S. typhimurium
Method: OECD Test Guideline 471
Result: Not mutagenic in Ames Test.
Remarks: (Lit.)

Carcinogenicity
No data available

Reproductive toxicity
Did not show teratogenic effects in animal experiments.
Animal testing did not show any effects on fertility.

Specific target organ toxicity - single exposure
The substance or mixture is not classified as specific target organ toxicant, single exposure.

Specific target organ toxicity - repeated exposure
The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

Aspiration hazard
No data available

11.2 Additional Information

Endocrine disrupting properties

Product:

Assessment	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

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SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	static test	- Morone saxatilis - 13,6 mg/l - 96 h

12.2 Persistence and degradability
Not applicable

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Endocrine disrupting properties
Product:

Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
No data available

SECTION 14: Transport information

14.1 UN number
ADR/RID: 3178 IMDG: 3178 IATA: 3178

14.2 UN proper shipping name
ADR/RID: FLAMMABLE SOLID, INORGANIC, N.O.S. (Iron Powder,)
IMDG: FLAMMABLE SOLID, INORGANIC, N.O.S. (Iron Powder,)
IATA: Flammable solid, inorganic, n.o.s. (Iron Powder,)

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14.3 Transport hazard class(es)

ADR/RID: 4.1	IMDG: 4.1	IATA: 4.1

14.4 Packaging group

ADR/RID: III	IMDG: III	IATA: III

14.5 Environmental hazards

ADR/RID: no	IMDG Marine pollutant: no	IATA: no

14.6 Special precautions for user

Tunnel restriction code : (E)

Further information : No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

This material safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

Other regulations

Take note of Dir 94/33/EC on the protection of young people at work.

15.2 Chemical Safety Assessment

For this product a chemical safety assessment was not carried out

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SECTION 16: Other information

Full text of other abbreviations

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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SAFETY DATA SHEET

Version 5.8
Revision Date 03/06/2015
Print Date 02/18/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Isopropyl alcohol

Product Number : W292907
Brand : Aldrich
Index-No. : 603-117-00-0

CAS-No. : 67-63-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H319 Causes serious eye irritation.
H336 May cause drowsiness or dizziness.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.

P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312	Call a POISON CENTER or doctor/ physician if you feel unwell.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

May form explosive peroxides.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	2-Propanol sec-Propyl alcohol Isopropyl alcohol Isopropanol
Formula	:	C_3H_8O
Molecular weight	:	60.10 g/mol
CAS-No.	:	67-63-0
EC-No.	:	200-661-7
Index-No.	:	603-117-00-0

Hazardous components

Component	Classification	Concentration
2-Propanol		
	Flam. Liq. 2; Eye Irrit. 2A; STOT SE 3; H225, H319, H336	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Handle and store under inert gas. hygroscopic

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
2-Propanol	67-63-0	TWA	200.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment		

		Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	400 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	400.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	400.000000 ppm 980.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	400.000000 ppm 980.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	500.000000 ppm 1,225.000000 mg/m3	USA. NIOSH Recommended Exposure Limits

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
2-Propanol	67-63-0	Acetone	40.0000 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 480 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm
Break through time: 60 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
impervious clothing, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: colourless
b)	Odour	alcohol-like
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -89.5 °C (-129.1 °F) - lit.
f)	Initial boiling point and boiling range	82 °C (180 °F) - lit.
g)	Flash point	12.0 °C (53.6 °F) - closed cup
h)	Evaporation rate	3.0
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or	Upper explosion limit: 12.7 %(V) Lower explosion limit: 2 %(V)

	explosive limits	
k)	Vapour pressure	43.2 hPa (32.4 mmHg) at 20.0 °C (68.0 °F) 58.7 hPa (44.0 mmHg) at 25.0 °C (77.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.785 g/cm3 at 25 °C (77 °F)
n)	Water solubility	completely soluble
o)	Partition coefficient: n-octanol/water	log Pow: 0.05
p)	Auto-ignition temperature	425.0 °C (797.0 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	20.8 mN/m at 25.0 °C (77.0 °F)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Test for peroxide formation before distillation or evaporation. Test for peroxide formation or discard after 1 year.
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

10.5 Incompatible materials
Oxidizing agents, Acid anhydrides, Aluminium, Halogenated compounds, Acids

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 5,045 mg/kg
Remarks: Behavioral:Altered sleep time (including change in righting reflex). Behavioral:Somnolence (general depressed activity).

LC50 Inhalation - Rat - 8 h - 16000 ppm

LD50 Dermal - Rabbit - 12,800 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Mild skin irritation

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation - 24 h

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	3 - Group 3: Not classifiable as to its carcinogenicity to humans (2-Propanol)
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
Inhalation, Oral - May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: NT8050000

Central nervous system depression, prolonged or repeated exposure can cause:, Nausea, Headache, Vomiting, narcosis, Drowsiness, Overexposure may cause mild, reversible liver effects., Aspiration may lead to:, Lung oedema, Pneumonia
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Kidney - Irregularities - Based on Human Evidence
Kidney - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 9,640.00 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 5,102.00 mg/l - 24 h
	Immobilization EC50 - Daphnia magna (Water flea) - 6,851 mg/l - 24 h
Toxicity to algae	EC50 - Desmodesmus subspicatus (green algae) - > 2,000.00 mg/l - 72 h
	EC50 - Algae - > 1,000.00 mg/l - 24 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No bioaccumulation is to be expected (log Pow <= 4).

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1219 Class: 3 Packing group: II
Proper shipping name: Isopropanol
Reportable Quantity (RQ):

Poison Inhalation Hazard: No

IMDG
UN number: 1219 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: ISOPROPANOL

IATA
UN number: 1219 Class: 3 Packing group: II
Proper shipping name: Isopropanol

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
2-Propanol	67-63-0	1987-01-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
2-Propanol	67-63-0	1987-01-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
2-Propanol	67-63-0	1987-01-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
2-Propanol	67-63-0	1987-01-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
STOT SE	Specific target organ toxicity - single exposure

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.8 Revision Date: 03/06/2015 Print Date: 02/18/2016

SAFETY DATA SHEET

Version 4.7
Revision Date 12/29/2015
Print Date 02/07/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Lead

Product Number : 391352
Brand : Aldrich

CAS-No. : 7439-92-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 2), H361
Specific target organ toxicity - repeated exposure (Category 2), H373
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H302 Harmful if swallowed.
H351 Suspected of causing cancer.
H361 Suspected of damaging fertility or the unborn child.
H373 May cause damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and

	understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Pb
Molecular weight	:	207.20 g/mol
CAS-No.	:	7439-92-1
EC-No.	:	231-100-4

Hazardous components

Component	Classification	Concentration
Lead		
	Acute Tox. 4; Carc. 2; Repr. 2; STOT RE 2; Aquatic Acute 1; Aquatic Chronic 1; H302, H351, H361, H373, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Lead oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	See 1910.1025		
Lead	7439-92-1	TWA	0.05 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Confirmed animal carcinogen with unknown relevance to humans		
		TWA	0.05 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Hematologic effects Peripheral Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		

		TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
		See Appendix C		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Lead	7439-92-1	Lead	30µg/ 100 ml	In blood	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Not critical			
		Lead	30µg/ 100 ml	In blood	ACGIH - Biological Exposure Indices (BEI)
		Not critical			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 327.4 °C (621.3 °F) - lit.
f)	Initial boiling point and boiling range	1,740 °C (3,164 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong acids

10.6 Hazardous decomposition products

Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity

Rat
Cytogenetic analysis

Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Lead)
NTP:	Reasonably anticipated to be a human carcinogen (Lead)
	Reasonably anticipated to be a human carcinogenThe reference note has been added by TD based on the background information of the NTP. (Lead)
OSHA:	1910.1025 (Lead)
	OSHA specifically regulated carcinogen (Lead)

Reproductive toxicity
Suspected human reproductive toxicant

Reproductive toxicity - Rat - Inhalation
Effects on Newborn: Biochemical and metabolic.

Reproductive toxicity - Rat - Oral
Effects on Newborn: Behavioral.

Reproductive toxicity - Mouse - Oral
Effects on Fertility: Female fertility index (e.g., # females pregnant per # sperm positive females; # females pregnant per # females mated). Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea).

Developmental Toxicity - Rat - Inhalation
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow).

Developmental Toxicity - Rat - Oral
Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow). Effects on Newborn: Growth statistics (e.g., reduced weight gain).

Developmental Toxicity - Rat - Oral
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Developmental Toxicity - Mouse - Oral
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
May cause damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: OF7525000

anemia

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality LOEC - Oncorhynchus mykiss (rainbow trout) - 1.19 mg/l - 96.0 h
	LC50 - Micropterus dolomieui - 2.2 mg/l - 96.0 h
	mortality NOEC - Salvelinus fontinalis - 1.7 mg/l - 10.0 d
Toxicity to daphnia and other aquatic invertebrates	mortality LOEC - Daphnia (water flea) - 0.17 mg/l - 24 h
	mortality NOEC - Daphnia (water flea) - 0.099 mg/l - 24 h
Toxicity to algae	mortality EC50 - Skeletonema costatum - 7.94 mg/l - 10 d

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Bioaccumulation: Oncorhynchus kisutch - 2 Weeks - 150 µg/l

Bioconcentration factor (BCF): 12

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Lead)
Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Lead)
Marine pollutant:yes
IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Lead)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Lead	7439-92-1	1994-04-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	1994-04-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	1994-04-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Lead	7439-92-1	1994-04-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Lead	CAS-No. 7439-92-1	Revision Date 1989-07-10
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Lead	CAS-No. 7439-92-1	Revision Date 1989-07-10

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H302	Harmful if swallowed.
H351	Suspected of causing cancer.
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.

H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	1
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.7 Revision Date: 12/29/2015 Print Date: 02/07/2016

SAFETY DATA SHEET

Version 5.7
Revision Date 05/27/2015
Print Date 02/23/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Lindane

Product Number : 233390
Brand : Aldrich
Index-No. : 602-043-00-6

CAS-No. : 58-89-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 4), H332
Acute toxicity, Dermal (Category 4), H312
Carcinogenicity (Category 2), H351
Effects on or via lactation, H362
Specific target organ toxicity - repeated exposure (Category 2), H373
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H301	Toxic if swallowed.
H312 + H332	Harmful in contact with skin or if inhaled
H351	Suspected of causing cancer.
H362	May cause harm to breast-fed children.
H373	May cause damage to organs through prolonged or repeated exposure.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P263	Avoid contact during pregnancy/ while nursing.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician. Rinse mouth.
P302 + P352 + P312	IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or doctor/ physician if you feel unwell.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P363	Wash contaminated clothing before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	1α,2α,3β,4α,5α,6β-Hexachlorocyclohexane γ-BHC
Formula	:	$C_6H_6Cl_6$
Molecular weight	:	290.83 g/mol
CAS-No.	:	58-89-9
EC-No.	:	200-401-2
Index-No.	:	602-043-00-6

Hazardous components

Component	Classification	Concentration
γ-1,2,3,4,5,6-Hexachlorocyclohexane		
	Acute Tox. 3; Acute Tox. 4; Carc. 2; Lact. ; STOT RE 2; Aquatic Acute 1; Aquatic Chronic 1; H301, H312 + H332, H351, H362, H373, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
γ-1,2,3,4,5,6-Hexachlorocyclohexane	58-89-9	TWA	0.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Liver damage Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	0.500000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		
		TWA	0.500000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 113 - 115 °C (235 - 239 °F) - lit.
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.85 g/cm3
n)	Water solubility	8.35 g/l at 25 °C (77 °F)
o)	Partition coefficient: n-octanol/water	Pow: 3.5 at 22 °C (72 °F)
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 88.0 mg/kg

LC50 Inhalation - Rat - 4 h - 1,560 mg/m3

Dermal: No data available

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation

Respiratory or skin sensitisation
Will not occur

Germ cell mutagenicity
No data available

Carcinogenicity

IARC:	2B - Group 2B: Possibly carcinogenic to humans (γ-1,2,3,4,5,6-Hexachlorocyclohexane)
NTP:	Reasonably anticipated to be a human carcinogenThe reference note has been added by TD based on the background information of the NTP. (γ-1,2,3,4,5,6-Hexachlorocyclohexane)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
Effects on or via lactation

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: GV4900000

Neurotoxic effects., Cyanosis, Headache, Nausea, Incoordination., Tremors, Vomiting, Dizziness, Seizures., Unconsciousness

Reproductive system. - Irregularities - Based on Human Evidence
Reproductive system. - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Cyprinus carpio (Carp) - 0.2 mg/l - 96.0 h
	LC50 - Cyprinodon variegatus (sheepshead minnow) - 0.9 - 1.3 mg/l - 96.0 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.03 - 0.28 mg/l - 48.0 h
	NOEC - Oncorhynchus mykiss (rainbow trout) - 0.056 mg/l - 3.0 d
	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.038 mg/l - 96.0 h

	LOEC - Oncorhynchus mykiss (rainbow trout) - 0.1 mg/l - 3.0 d
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.80 - 6.50 mg/l - 48 h
	LOEC - Daphnia (water flea) - 0.021 mg/l - 7 d
Toxicity to algae	EC50 - Algae - 4.00 mg/l - 72 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Pimephales promelas (fathead minnow) - 304 d - 0.0091 mg/l
	Bioconcentration factor (BCF): 674

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
Very toxic to aquatic life with long lasting effects.
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (γ-1,2,3,4,5,6-Hexachlorocyclohexane)
Reportable Quantity (RQ): 1 lbs
Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG
UN number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (γ-1,2,3,4,5,6-Hexachlorocyclohexane)
Marine pollutant:yes

IATA
UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (γ-1,2,3,4,5,6-Hexachlorocyclohexane)

15. REGULATORY INFORMATION

SARA 302 Components
The following components are subject to reporting levels established by SARA Title III, Section 302:

	CAS-No.	Revision Date
γ-1,2,3,4,5,6-Hexachlorocyclohexane	58-89-9	2007-07-01

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
γ-1,2,3,4,5,6-Hexachlorocyclohexane	58-89-9	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
γ-1,2,3,4,5,6-Hexachlorocyclohexane	58-89-9	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
γ-1,2,3,4,5,6-Hexachlorocyclohexane	58-89-9	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
γ-1,2,3,4,5,6-Hexachlorocyclohexane	58-89-9	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
γ-1,2,3,4,5,6-Hexachlorocyclohexane	58-89-9	2009-02-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H301	Toxic if swallowed.
H312	Harmful in contact with skin.
H312 + H332	Harmful in contact with skin or if inhaled
H332	Harmful if inhaled.
H351	Suspected of causing cancer.
H362	May cause harm to breast-fed children.
H373	May cause damage to organs through prolonged or repeated exposure.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.7 Revision Date: 05/27/2015 Print Date: 02/23/2016

SAFETY DATA SHEET

Version 6.6
Revision Date 09/06/2024
Print Date 09/07/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Magnesium

Product Number : 266302
Brand : Sigma-Aldrich
Index-No. : 012-002-00-9
CAS-No. : 7439-95-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable solids (Category 1), H228
Self-heating chemicals (Category 1), H251
Chemicals which, in contact with water, emit flammable gases (Category 2), H261

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For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Danger

Hazard Statements

H228	Flammable solid.
H251	Self-heating; may catch fire.
H261	In contact with water releases flammable gas.

Precautionary Statements

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P223	Do not allow contact with water.
P231 + P232	Handle under inert gas. Protect from moisture.
P235 + P410	Keep cool. Protect from sunlight.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P280	Wear protective gloves/ eye protection/ face protection.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P402 + P404	Store in a dry place. Store in a closed container.
P403 + P235	Store in a well-ventilated place. Keep cool.
P407	Maintain air gap between stacks/ pallets.
P420	Store away from other materials.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Combustible dust

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	Mg
Molecular weight	:	24.31 g/mol
CAS-No.	:	7439-95-4
EC-No.	:	231-104-6
Index-No.	:	012-002-00-9

No components need to be disclosed according to the applicable regulations.

For the full text of the H-Statements mentioned in this Section, see Section 16.

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SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most). Consult doctor if feeling unwell.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Special powder against metal fire Cover with dry sand or cement.

Unsuitable extinguishing media
Foam Water

5.2 Special hazards arising from the substance or mixture

Magnesium oxide
Not combustible.
May not get in touch with: Water
Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters

In the event of fire, wear self-contained breathing apparatus.

5.4 Further information

none

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SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid inhalation of dusts. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Keep workplace dry. Do not allow product to come into contact with water.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Change contaminated clothing. Wash hands after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep away from heat and sources of ignition.
Never allow product to get in contact with water during storage.

Storage class
Storage class (TRGS 510): 4.2: Pyrophoric and self-heating hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

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8.2 Exposure controls

Appropriate engineering controls
Change contaminated clothing. Wash hands after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter type P1
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

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SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: chips
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 648 °C (1198 °F) - lit.
f)	Initial boiling point and boiling range	1,090 °C 1,994 °F - lit.
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	May form combustible dust concentrations in air.
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	1 hPa at 621 °C (1150 °F)
l)	Vapor density	No data available
m)	Density	1.74 g/mL at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	The substance or mixture is classified as self heating with the category 1.
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

No data available

SECTION 10: Stability and reactivity

10.1 Reactivity

Self-heating; may catch fire.

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10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Risk of ignition or formation of inflammable gases or vapours with:
Oxidizing agents
alkalines
Halogenated hydrocarbon
halogens
Alcohols
nitrates
acids
Water

10.4 Conditions to avoid
Exposure to moisture. Exposure to air.
Moisture.

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
Remarks: No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

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Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, chills, Fever, fatigue, muscle pain, joint pain, rash, Anorexia.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Liver - Irregularities - Based on Human Evidence

Liver - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 1869 Class: 4.1 Packing group: III
Proper shipping name: Magnesium
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 1869 Class: 4.1 Packing group: III EMS-No: F-G, S-G
Proper shipping name: MAGNESIUM

IATA
UN number: 1869 Class: 4.1 Packing group: III
Proper shipping name: Magnesium

SECTION 15: Regulatory information

CERCLA Reportable Quantity
This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Fire Hazard
Reactivity Hazard
Chronic Health Hazard

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know
No components are subject to the Massachusetts Right to Know Act.

Maine Chemicals of High Concern

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Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.6 Revision Date: 09/06/2024 Print Date: 09/07/2024

The life science business of Merck KGaA, Darmstadt, Germany
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SAFETY DATA SHEET

Version 4.6
Revision Date 03/02/2015
Print Date 02/07/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Manganese

Product Number : 463728
Brand : Aldrich

CAS-No. : 7439-96-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Substances and mixtures, which in contact with water, emit flammable gases (Category 1), H260
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H260 In contact with water releases flammable gases which may ignite spontaneously.
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P223 Keep away from any possible contact with water, because of violent reaction and possible flash fire.
P231 + P232 Handle under inert gas. Protect from moisture.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P335 + P334 Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.

P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P402 + P404	Store in a dry place. Store in a closed container.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Mn
Molecular weight	:	54.94 g/mol
CAS-No.	:	7439-96-5
EC-No.	:	231-105-1

Hazardous components

Component	Classification	Concentration
Manganese		
	Water-react. 1; Aquatic Acute 3; Aquatic Chronic 3; H260, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Dry powder Carbon dioxide (CO2)

Unsuitable extinguishing media
Water

5.2 Special hazards arising from the substance or mixture
Manganese/manganese oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.Keep away from sources of ignition - No smoking.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Moisture sensitive. Keep in a dry place.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Manganese	7439-96-5	TWA	0.200000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC)		
		C	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Ceiling limit is to be determined from breathing-zone air samples.		
		C	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Ceiling limit is to be determined from breathing-zone air samples.		

		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		C	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Ceiling limit is to be determined from breathing-zone air samples.		
		TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.200000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) varies		
		TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment 2014 Adoption varies		
		TWA	0.020000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment 2014 Adoption varies		
		TWA	0.1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment varies		
		TWA	0.02 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment varies		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
impervious clothing, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: grey
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,244 °C (2,271 °F) - lit.
f)	Initial boiling point and boiling range	1,962 °C (3,564 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	7.3 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Reacts violently with water.

10.4 Conditions to avoid
Exposure to moisture

10.5 Incompatible materials
acids, Halogens, Bases, Phosphorus, Sulphur oxides, Peroxides

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 9,000 mg/kg

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Mild skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation - 24 h

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

Carcinogenicity - Rat - Intramuscular
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Tumorigenic:Tumors at site or application.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

May cause reproductive disorders.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: OO9275000

Men exposed to manganese dusts showed a decrease in fertility. Chronic manganese poisoning primarily involves the central nervous system. Early symptoms include languor, sleepiness and weakness in the legs. A stolid mask-like appearance of the face, emotional disturbances such as uncontrollable laughter and a spastic gait with tendency to fall in walking are findings in more advanced cases. High incidence of pneumonia has been found in workers exposed to the dust or fume of some manganese compounds.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 40 mg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life.

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3208 Class: 4.3 Packing group: I
Proper shipping name: Metallic substance, water-reactive, n.o.s. (Manganese)

Poison Inhalation Hazard: No

IMDG
UN number: 3208 Class: 4.3 Packing group: I EMS-No: F-G, S-N
Proper shipping name: METALLIC SUBSTANCE, WATER-REACTIVE, N.O.S. (Manganese)

IATA
UN number: 3208 Class: 4.3 Packing group: I
Proper shipping name: Metallic substance, water-reactive, n.o.s. (Manganese)
IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

SARA 311/312 Hazards
Reactivity Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H260	In contact with water releases flammable gases which may ignite spontaneously.
H402	Harmful to aquatic life.
H412	Harmful to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	2

NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	2
Special hazard.I:	W

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.6 Revision Date: 03/02/2015 Print Date: 02/07/2016

SAFETY DATA SHEET

Version 6.12
Revision Date 07/27/2024
Print Date 07/28/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : *m*-Cresol

Product Number : W353000
Brand : Aldrich
Index-No. : 604-004-00-9
CAS-No. : 108-39-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 4), H227
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Dermal (Category 3), H311

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Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Short-term (acute) aquatic hazard (Category 2), H401
Long-term (chronic) aquatic hazard (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word	Danger
Hazard Statements	
H227	Combustible liquid.
H301 + H311	Toxic if swallowed or in contact with skin.
H314	Causes severe skin burns and eye damage.
H401	Toxic to aquatic life.
H412	Harmful to aquatic life with long lasting effects.
Precautionary Statements	
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : 3-Methylphenol

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Formula	:	C_7H_8O
Molecular weight	:	108.14 g/mol
CAS-No.	:	108-39-4
EC-No.	:	203-577-9
Index-No.	:	604-004-00-9

Component	Classification	Concentration
meta-Cresol		
	Flam. Liq. 4; Acute Tox. 3; Skin Corr. 1B; Eye Dam. 1; Aquatic Acute 2; Aquatic Chronic 3; H227, H301, H311, H314, H318, H401, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
If swallowed: give water to drink (two glasses at most). Seek medical advice immediately. In exceptional cases only, if medical care is not available within one hour, induce vomiting (only in persons who are wide awake and fully conscious), administer activated charcoal (20 - 40 g in a 10% slurry) and consult a doctor as quickly as possible. Do not attempt to neutralise.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

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SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air on intense heating.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information

Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures

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Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Moisture sensitive.

Storage class
Storage class (TRGS 510): 6.1A: Combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
meta-Cresol	108-39-4	TWA	2.3 ppm 10 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5 ppm 22 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Remarks	Skin designation		
		TWA	20 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Not classifiable as a human carcinogen Danger of cutaneous absorption		
		PEL	5 ppm 22 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

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Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Chloroprene
Minimum layer thickness: 0.65 mm
Break through time: 480 min
Material tested:KCL 720 Camapren®

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Latex gloves
Minimum layer thickness: 0.6 mm
Break through time: 60 min
Material tested:Lapren® (KCL 706 / Aldrich Z677558, Size M)

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter A-(P3)
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Color: colorless, light yellow
b)	Odor	phenol-like

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c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 8 - 10 °C (46 - 50 °F) - lit.
f)	Initial boiling point and boiling range	203 °C 397 °F - lit.
g)	Flash point	86 °C (187 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 1.35 %(V) Lower explosion limit: 1.06 %(V)
k)	Vapor pressure	< 1 hPa at 20 °C (68 °F)
l)	Vapor density	3.73 - (Air = 1.0)
m)	Density	1.034 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	1.0320 °C
n)	Water solubility	22.7 g/l at 25 °C (77 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 1.96 - Bioaccumulation is not expected.
p)	Autoignition temperature	559 °C (1038 °F) at 1,013 hPa
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	Not classified as explosive.
t)	Oxidizing properties	none

9.2 Other safety information

Dissociation constant	10.09 at 25 °C (77 °F)
Relative vapor density	3.73 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity

Forms explosive mixtures with air on intense heating.
A range from approx. 15 Kelvin below the flash point is to be rated as critical.

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .

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10.3 Possibility of hazardous reactions
Violent reactions possible with:
Strong oxidizing agents
Nitric acid
fuming sulfuric acid
chlorosulfonic acid
alkalines
Iron
Lead

10.4 Conditions to avoid
Strong heating.

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male - 242 mg/kg
(OECD Test Guideline 401)
Symptoms: If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the esophagus and the stomach.
Symptoms: mucosal irritations, Cough, Shortness of breath, Possible damages:, damage of respiratory tract
Inhalation: Corrosive to respiratory system.
LD50 Dermal - Rabbit - 620 mg/kg
Remarks: Behavioral:Somnolence (general depressed activity).
Behavioral:Tetany.
(RTECS)

Skin corrosion/irritation
Skin - Rabbit
Result: Causes burns. - 24 h
Remarks: (ECHA)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Serious eye damage/eye irritation
Remarks: Causes serious eye damage.

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
Test Type: Ames test
Test system: Escherichia coli/Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471

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Result: negative
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: Chinese hamster lung cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473
Result: positive
Test Type: In vitro mammalian cell gene mutation test
Test system: mouse lymphoma cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative

Test Type: Chromosome aberration test
Species: Mouse
Cell type: Bone marrow
Application Route: Oral
Method: OECD Test Guideline 475
Result: negative

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Rat - male - Oral - 13 Weeks - NOAEL (No observed adverse effect level) - 50 mg/kg

RTECS: GO6125000
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., Cough, Shortness of breath, Headache, Nausea
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After absorption:

Systemic effects:

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Headache
Nausea
Vomiting
Dizziness
agitation, spasms
respiratory arrest
Unconsciousness

Damage to:

Central nervous system
Liver
Kidney

This substance should be handled with particular care.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	static test LC50 - Salvelinus fontinalis - 7.6 mg/l - 96 h Remarks: (ECHA)
	static test LC50 - Oncorhynchus mykiss (rainbow trout) - 8.6 mg/l - 96 h Remarks: (ECHA)
	static test LC50 - Salmo trutta (brown trout) - 8.4 mg/l - 96 h Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates	flow-through test EC50 - Daphnia pulicaria - > 99.5 mg/l - 48 h (US-EPA)
Toxicity to fish(Chronic toxicity)	flow-through test NOEC - Pimephales promelas (fathead minnow) - 1.35 mg/l - 32 d (OECD Test Guideline 210) Remarks: The value is given in analogy to the following substances: p-cresol
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	semi-static test NOEC - Daphnia magna (Water flea) - 1 mg/l - 21 d Remarks: (ECHA) The value is given in analogy to the following substances: p-cresol

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12.2 Persistence and degradability

Biodegradability aerobic - Exposure time 10 d
Result: 96 % - Inherently biodegradable.
(OECD Test Guideline 302B)

12.3 Bioaccumulative potential

Bioaccumulation Leuciscus idus (Golden orfe) - 3 d
- 0.05 mg/l(meta-Cresol)

Bioconcentration factor (BCF): 17 - 20

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

Biological effects:
Hazard for drinking water supplies.
Change in the flavour characteristics of fish protein.
Discharge into the environment must be avoided.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)

UN number: 2076 Class: 6.1 (8) Packing group: II
Proper shipping name: Cresols, liquid
Reportable Quantity (RQ): 100 lbs
Reportable Quantity (RQ): 100 lbs
Poison Inhalation Hazard: No

IMDG

UN number: 2076 Class: 6.1 (8) Packing group: II EMS-No: F-A, S-B
Proper shipping name: CRESOLS, LIQUID

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IATA
UN number: 2076 Class: 6.1 (8) Packing group: II
Proper shipping name: Cresols, liquid

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
meta-Cresol	108-39-4	100	100
meta-Cresol	108-39-4	100	100 (D024)

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

meta-Cresol 108-39-4 >= 90 - <= 100 %

Clean Air Act

This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
The following chemical(s) are listed as HAP under the U.S. Clean Air Act, Section 112 (40 CFR 61):

meta-Cresol 108-39-4 >= 90 - <= 100 %

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).
The following chemical(s) are listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489):

meta-Cresol 108-39-4 >= 90 - <= 100 %

Clean Water Act

The following Hazardous Substances are listed under the U.S. CleanWater Act, Section 311, Table 116.4A:

meta-Cresol 108-39-4 >= 90 - <= 100 %

This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.
This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307
This product does not contain any priority pollutants related to the U.S. Clean Water Act

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US State Regulations

Massachusetts Right To Know

meta-Cresol	108-39-4

Pennsylvania Right To Know

meta-Cresol	108-39-4

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.12 Revision Date: 07/27/2024 Print Date: 07/28/2024

The life science business of Merck KGaA, Darmstadt, Germany
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SAFETY DATA SHEET

Version 6.5
Revision Date 02/07/2023
Print Date 02/07/2023

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Mercury

Product Number : 215457
Brand : SIGALD
Index-No. : 080-001-00-0
CAS-No. : 7439-97-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Scientific research and development, Reagent for analysis

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Inhalation (Category 2), H330
Reproductive toxicity (Category 1B), H360
Specific target organ toxicity - repeated exposure (Category 1), H372
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Danger

The life science business of Merck KGaA, Darmstadt, Germany
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Hazard statement(s)

H330	Fatal if inhaled.
H360	May damage fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284	Wear respiratory protection.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	Hg
Molecular weight	:	200.59 g/mol
CAS-No.	:	7439-97-6
EC-No.	:	231-106-7
Index-No.	:	080-001-00-0

Component	Classification	Concentration
mercury		
	Acute Tox. 2; Repr. 1B; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H330, H360, H372, H400, H410 M-Factor - Aquatic Acute: 1 - Aquatic Chronic: 100	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

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SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Mercury/mercury oxides.
Not combustible.
Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

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SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal. In some instances, a mercury spill kit may be used. Please consult with your site EHS representative to determine the most appropriate clean up method.Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Store under inert gas.

Storage class
Storage class (TRGS 510): 6.1B: Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

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Component	CAS-No.	Value	Control parameters	Basis
mercury	7439-97-6	C	0.1 mg/m3	USA. NIOSH Recommended Exposure Limits
	Remarks	Potential for dermal absorption		
		CEIL	1.0mg/10m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	0.05 mg/m3	USA. Table Z-1-A Limits for Air Contaminants (1989 vacated values)
		Skin notation		
		TWA	0.025 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen Danger of cutaneous absorption		
		TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

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Body Protection
protective clothing

Respiratory protection
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Color: silver, white
b)	Odor	odorless
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -38.87 °C (-37.97 °F) - lit.
f)	Initial boiling point and boiling range	356.6 °C 673.9 °F - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	The product is not flammable.
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	< 0.01 hPa at 20 °C (68 °F) 1 hPa at 126 °C(259 °F)
l)	Vapor density	6.93 - (Air = 1.0)
m)	Density	13.55 g/cm3 at 25 °C (77 °F)
	Relative density	No data available
n)	Water solubility	0.00006 g/l at 25 °C (77 °F)
o)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available

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s) Explosive properties No data available

t) Oxidizing properties none

9.2 Other safety information

Relative vapor density	6.93 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Risk of explosion with:
Acetylene
Alkali metals
Aluminum
Amines
Ammonia
chlorine dioxide
Potassium
sodium
oxalic acid
perchlorates
Risk of ignition or formation of inflammable gases or vapours with:
Chlorine
silanes
Oxygen
Generates dangerous gases or fumes in contact with:
Nitric acid
Exothermic reaction with:
Bromine
Metals
acetylidene
Oxygen

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
Aluminum, Lead, Copper, silver, Zinc, zinc alloys, Tin

10.6 Hazardous decomposition products
In the event of fire: see section 5

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SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
LC50 Inhalation - Rat - male - 2 h - < 27 mg/m3 - vapor

Dermal: No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
Presumed human reproductive toxicant

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

11.2 Additional Information

RTECS: OV4550000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

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SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	mortality LC50 - Cyprinus carpio (Carp) - 0.160 mg/l - 96 h
Toxicity to fish(Chronic toxicity)	Remarks: No data available (mercury)

12.2 Persistence and degradability

The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

Bioaccumulation	Carassius auratus (goldfish) - 1,789 d - 0.25 µg/l(mercury)
	Bioconcentration factor (BCF): 155,986

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)

UN number: 2809 Class: 8 (6.1) Packing group: III
Proper shipping name: Mercury
Reportable Quantity (RQ): 1 lbs
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG

UN number: 2809 Class: 8 (6.1) Packing group: III EMS-No: F-A, S-B
Proper shipping name: MERCURY
Marine pollutant : yes

IATA

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UN number: 2809 Class: 8 (6.1) Packing group: III
Proper shipping name: Mercury

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
mercury	7439-97-6	2015-11-23

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Reportable Quantity : D009 lbs

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
mercury	7439-97-6	2015-11-23

California Prop. 65 Components

	CAS-No.	Revision Date
, which is/are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.mercury	7439-97-6	2013-12-20

SECTION 16: Other information

Further information
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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SAFETY DATA SHEET

Version 6.8
Revision Date 09/07/2024
Print Date 09/08/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Methoxychlor

Product Number : 36161
Brand : Sigma-Aldrich
CAS-No. : 72-43-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302
Reproductive toxicity (Category 2), H361
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

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For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Warning

Hazard Statements

H302	Harmful if swallowed.
H361	Suspected of damaging fertility or the unborn child.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : 2,2-Bis(4-methoxyphenyl)-1,1,1-trichloroethane
DMDT
1,1,1-Trichloro-2,2-bis-(p-methoxyphenyl)ethane

Formula : $C_{16}H_{15}Cl_3O_2$
Molecular weight : 345.65 g/mol
CAS-No. : 72-43-5
EC-No. : 200-779-9

Component	Classification	Concentration
Methoxychlor		
	Acute Tox. 4; Repr. 2; Aquatic Acute 1; Aquatic Chronic 1; H302, H361, H400, H410 M-Factor - Aquatic Acute:	<= 100 %

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	1,000 - Aquatic Chronic: 1,000	

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

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5.4 Further information

Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid inhalation of dusts. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry.

Storage class
Storage class (TRGS 510): 11: Combustible Solids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Methoxychlor	72-43-5	TWA	10 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not classifiable as a human carcinogen		
		Potential Occupational Carcinogen		

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		TWA	15 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	10 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter type P3
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.

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Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 86 - 88 °C (187 - 190 °F) - lit.
f)	Initial boiling point and boiling range	No data available
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	1.41 g/cm3 at 25 °C (77 °F)
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

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9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Violent reactions possible with:
Strong oxidizing agents

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Mouse - 510 mg/kg
Remarks: Behavioral:Excitement.
Behavioral:Convulsions or effect on seizure threshold.
Behavioral:Ataxia.
(RTECS)
Inhalation: No data available
LD50 Dermal - Rat - > 6,000 mg/kg
Remarks: (RTECS)

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

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Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
Suspected of damaging the unborn child.
Suspected of damaging fertility.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: KJ3675000
nervous system effects, Weakness, Diarrhea
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.052 mg/l - 96 h Remarks: (Lit.)
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.00078 mg/l - 48 h Remarks: (Lit.)
Toxicity to algae	EC50 - Scenedesmus quadricauda (Green algae) - 0.6 mg/l - 72 h Remarks: (Lit.)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Pimephales promelas (fathead minnow) - 32 d - 0.0035 mg/l(Methoxychlor) Bioconcentration factor (BCF): 8,300

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12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Methoxychlor) (Methoxychlor)
Reportable Quantity (RQ): 1 lbs
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Methoxychlor) (Methoxychlor)
Marine pollutant : yes
Marine pollutant : no

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Methoxychlor) (Methoxychlor)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

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SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Methoxychlor	72-43-5	1	1
Methoxychlor	72-43-5	1	1 (D014)

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Acute Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Methoxychlor 72-43-5 >= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

Methoxychlor 72-43-5

Pennsylvania Right To Know

Methoxychlor 72-43-5

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

International Regulations

Stockholm Convention (Persistent Organic Pollutants) : Methoxychlor

The ingredients of this product are reported in the following inventories:

TSCA : Product contains substance(s) not listed on TSCA inventory.

TSCA list

No substances are subject to a Significant New Use Rule.

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No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.8 Revision Date: 09/07/2024 Print Date: 09/08/2024

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SAFETY DATA SHEET

Methyl Bromide (MUP)

Version: 1.0 | Revision Date: 05/14/2015 | Print Date: 08/13/2015

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Methyl Bromide (MUP)

Product Use Description: EPA Registered Pesticide

Synonyms: Methyl Bromide

Company: Chemtura Corporation
199 Benson Road
Middlebury, CT
06749
United States of America

Telephone: (US) +1 866-430-2775

Emergency telephone number: CHEMTREC: (24 hours) 800-424-9300
:
Chemtura Corporation Emergency Response: CHEMTURA : 800-292-5898

For additional emergency telephone numbers see section 16 of the Safety Data Sheet.

Prepared by Product Safety Department
(US) +1 866-430-2775

MSDSRequest@chemtura.com

Recommended use of the chemical and restrictions on use

Recommended use : EPA Registered Pesticide

SECTION 2. HAZARDS IDENTIFICATION

Form	gas
Colour	colourless
Odour	odourless

GHS Classification

Flammable gases	:	Category 1
Acute toxicity (Oral)	:	Category 3
Acute toxicity (Inhalation)	:	Category 3
Skin irritation	:	Category 2
Eye irritation	:	Category 2A
Germ cell mutagenicity	:	Category 2
Specific target organ toxicity - single exposure	:	Category 3 (Respiratory system)
Specific target organ toxicity - repeated exposure	:	Category 2

Acute aquatic toxicity : Category 1

GHS Label element

Signal word : **Danger**

Hazard pictograms :



Hazard statements : H220 Extremely flammable gas.
H301 + H331 Toxic if swallowed or if inhaled
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H341 Suspected of causing genetic defects.
H373 May cause damage to organs through prolonged or repeated exposure.
H400 Very toxic to aquatic life.

Other hazards : None

Precautionary statements : **Prevention:**
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.
P280 Wear eye protection/ face protection.
P281 Use personal protective equipment as required.
Response:
P301 + P310 + P330 IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician. Rinse mouth.
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P311 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/

attention.
P362 Take off contaminated clothing and wash before reuse.
P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 Eliminate all ignition sources if safe to do so.
P391 Collect spillage.
Storage:
P403 Store in a well-ventilated place.
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Carcinogenicity:

IARC Group 3: Not classifiable as to its carcinogenicity to humans

bromomethane	74-83-9
chloromethane	74-87-3

OSHA No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

NTP No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Environmental Effects

Environmental Effects : Dangerous for the environment

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous components

Chemical Name	CAS-No.	Concentration (%)
bromomethane	74-83-9	>= 90 - <= 100 %
chloromethane	74-87-3	>= 0.1 - < 1 %

SECTION 4. FIRST AID MEASURES

If inhaled : Get medical attention immediately.
If breathed in, move person into fresh air.
Give oxygen or artificial respiration if needed.

In case of skin contact : Get medical attention immediately.
Take off contaminated clothing and shoes immediately.
Wash off immediately with plenty of water for at least 15 minutes.
Wash contaminated clothing before re-use.
Destroy contaminated shoes.

In case of eye contact	:	Get medical attention immediately. Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. Get medical attention.
If swallowed	:	Call a physician or poison control centre immediately. If swallowed, DO NOT induce vomiting unless directed to do so by medical personnel. Rinse mouth with water. Never give anything by mouth to an unconscious person.
Most important symptoms and effects, both acute and delayed	:	irritant effects mutagenic effects Gastrointestinal disturbance Nausea Vomiting Respiratory disorder Unconsciousness Inhalation may provoke the following symptoms: Fatality
Notes to physician	:	For specialist advice physicians should contact the Poisons Information Service.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Keep containers and surroundings cool with water spray.
Specific hazards during firefighting	:	Burning produces noxious and toxic fumes. Thermal decomposition can lead to release of irritating gases and vapours. Container may explode if heated.
Specific extinguishing methods	:	In the event of fire, wear self-contained breathing apparatus. Wear personal protective equipment.
Special protective equipment for firefighters	:	Wear full protective clothing and self-contained breathing apparatus.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	For personal protection see section 8.

Environmental precautions	:	Toxic to aquatic life. Do not contaminate ponds, waterways or ditches with chemical or used container. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods and materials for containment and cleaning up	:	Inform the responsible authorities in case of gas leakage, or of entry into waterways, soil or drains.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling	:	Methyl bromide has no odor at dangerous levels and is extremely hazardous. Use personal protective equipment as required. Do not contaminate water, food or feed by storage or disposal. Avoid contact with skin, eyes and clothing. Do not breathe vapours or spray mist. Persons moving or handling containers should wear protective clothing. Open container only in a well-ventilated area wearing protective clothing and respiratory protection if necessary. Cylinders should not be subjected to rough handling or mechanical shock such as dropping, bumping, dragging, or sliding. Do not use rope slings, hooks, tongs, or similar devices to unload cylinders. Transport cylinders using hand truck, fork truck or other device to which the cylinder can be firmly secured. Do not remove valve protection bonnet and safety cap until immediately before use. Replace safety cap and valve protection bonnet when cylinder is not in use. When cylinder is empty close, valve, screw safety cap onto valve outlet, and replace protection bonnet before returning to shipper. Only a registrant is authorized to refill cylinders. Do not use cylinders for any other purpose.
Conditions for safe storage	:	Store in upright position only. Keep in a dry, cool and well-ventilated place. Store locked up. Post as a pesticide storage area. Store cylinders upright, secured to a rack or wall to prevent tipping. Keep away from flames and sparks. Keep away from heat and sources of ignition. Keep container tightly closed.
Materials to avoid	:	Aluminium, Magnesium, Zinc, Alkali metals, Strong bases

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Form of exposure	Permissible concentration	Basis
bromomethane	74-83-9	TWA	1 ppm	ACGIH
		C	20 ppm 80 mg/m3	OSHA Z-1
		TWA	5 ppm 20 mg/m3	OSHA P0
chloromethane	74-87-3	TWA	50 ppm	ACGIH
		STEL	100 ppm	ACGIH
		TWA	100 ppm	OSHA Z-2
		CEIL	200 ppm	OSHA Z-2
		Peak	300 ppm	OSHA Z-2
		TWA	50 ppm 105 mg/m3	OSHA P0
		STEL	100 ppm 205 mg/m3	OSHA P0

Engineering measures : Use local ventilation to keep levels below established threshold values.
Adequate general ventilation is recommended when handling to control airborne levels.
Do not use in areas without adequate ventilation.
Use mechanical ventilation for general area control.

Personal protective equipment

Respiratory protection : Use a direct reading detection device for determining methyl bromide air concentrations. Detection devices must have a sensitivity of at least 1 ppm for methyl bromide. Device manufacturers instructions must be followed.
For protection from concentrations greater than 50 times the PEL, wear a NIOSH/MSHA approved self contained breathing apparatus (SCBA). All persons entering the affected area must wear a NIOSH/MSHA approved SCBA if the air concentrations of methyl bromide is unknown, or, if the methyl bromide air concentrations is measured at greater than 1ppm.
In emergencies such as a spill or leak, or when corrective action is needed to reduce air concentrations to acceptable levels, wear a SCBA and PPE required for potential contact with fumigant liquid.
Consult the OSHA respiratory protection information located at 29CFR1910.134 and the American National Standard Institue's Practices of Respiratory Protection Z88.2.

Eye protection : Full face shield or safety glasses with brow and temple shields. Do NOT wear goggles.
If full face respiratory protection is not required, wear full-face shield when handling liquid fumigant.

Skin and body protection : Loose-fitting or well ventilated long-sleeved shirt and pants. Shoes and socks. Do NOT wear jewelry, gloves, tight clothing, rubber protective clothing, or rubber boots when handling.

Hygiene measures	:	Wash thoroughly after handling. For personal hygiene purposes, use adequate clothing to prevent skin contact. Make sure piping is empty before doing maintenance work. All persons working with methyl bromide should be trained in the hazards, use of required respirator equipment, emergency procedures and in the proper use of methyl bromide as a fumigant where applicable.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	gas
Color	:	colourless
Odor	:	odourless
Odour Threshold	:	No data available
pH	:	No data available
Melting point/range	:	Not applicable
Boiling point/boiling range	:	3.56 °CMethyl bromide
Evaporation rate	:	Not applicable
Flash point	:	Not applicable
Upper explosion limit	:	ca. 15 %(V) Methyl bromide
Lower explosion limit	:	ca. 10 %(V) Methyl bromide
Vapour pressure	:	1,900 hPa (20 °C) 1420 mm Hg Methyl bromide
Relative vapour density	:	ca. 3.27Methyl bromide
Relative density	:	No data available
Bulk Density	:	No data available
Density	:	No data available
Solubility(ies)		
Water solubility	:	ca. 17.5 g/l Methyl bromide (20 °C)
Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Auto-ignition temperature	:	No data available

Thermal decomposition	:	No data available
Viscosity		
Viscosity, kinematic	:	No data available
		Not applicable

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No dangerous reaction known under conditions of normal use.
Chemical stability	:	No decomposition if stored and applied as directed.
Possibility of hazardous reactions	:	Will not occur.
Conditions to avoid	:	None known.
Incompatible materials	:	Aluminium Magnesium Zinc Alkali metals Strong bases
Hazardous decomposition products	:	Carbon oxides Hydrogen halides

SECTION 11. TOXICOLOGICAL INFORMATION

Acute oral toxicity (Product)	:	Acute toxicity estimate: 214 mg/kg Method: Calculation method
Acute inhalation toxicity (Product)	:	Acute toxicity estimate: Exposure time: 4 h Method: Calculation method
Skin irritation (Product)	:	Remarks: Irritating to skin.
Eye irritation (Product)	:	Remarks: Irritating to eyes.
Aspiration toxicity (Product)	:	No aspiration toxicity classification

Further information (Product) : Acute Health Hazard

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Toxicity to fish (Product) : Remarks:
No data available

Elimination information (persistence and degradability)

Bioaccumulation (Product) : Remarks:
No data available

Mobility (Product) : Remarks:
No data available

Biodegradability (Product) : Result: No data available

Further information on ecology

Ecotoxicology Assessment

Results of PBT assessment (Product)
This mixture contains no substance considered to be persistent, bioaccumulating and toxic (PBT).

Additional ecological information (Product) : Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
These products are toxic to fish and wildlife.Keep out of lakes, streams and ponds. Do not contaminate water by cleaning of equipment or disposal of wastes.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : Dispose of as hazardous waste in compliance with local and national regulations.
Dispose of wastes in an approved waste disposal facility.
Do not contaminate ponds, waterways or ditches with chemical or used container.

SECTION 14. TRANSPORT INFORMATION

DOT

UN number	:	1062
Description of the goods	:	Methyl bromide
Class	:	2.3
Environmentally hazardous	:	no
		Poison Inhalation Hazard - Zone C

IATA

UN number	:	1062
Class	:	2.3
		Not permitted for transport

IMDG

UN number	:	1062
Description of the goods	:	METHYL BROMIDE
Class	:	2.3
EmS Number 1	:	F-C
EmS Number 2	:	S-U
Marine pollutant	:	no

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
bromomethane	74-83-9	1000	1000

SARA 304 Extremely Hazardous Substances Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
bromomethane	74-83-9	1000	1000

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 302 : The following components are subject to reporting levels established by SARA Title III, Section 302:
bromomethane 74-83-9

	bromomethane	74-83-9
SARA 313	: The following components are subject to reporting levels established by SARA Title III, Section 313:	
	bromomethane	74-83-9

California Prop 65 WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

bromomethane	74-83-9
chloromethane	74-87-3

The components of this product are reported in the following inventories:

US.TSCA	On TSCA Inventory
DSL	All components of this product are on the Canadian DSL.
AICS	On the inventory, or in compliance with the inventory
NZIoC	Not in compliance with the inventory
ENCS	On the inventory, or in compliance with the inventory
KECI	On the inventory, or in compliance with the inventory
PICCS	On the inventory, or in compliance with the inventory
IECSC	On the inventory, or in compliance with the inventory
CH INV	The formulation contains substances listed on the Swiss Inventory

SECTION 16. OTHER INFORMATION

Further information

Other Emergency Phone Number

Latin America:	Brazil	+55 113 711 9144
	All other countries	+44 (0) 1235 239 670
Mexico:		+52 555 004 8763

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Methyl chloride (Refrigerant gas R 40)

Safety Data Sheet P-4622

This SDS conforms to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.

Date of issue: 01/01/1980 Revision date: 10/17/2016 Supersedes: 10/14/2015

SECTION: 1. Product and company identification

1.1. Product identifier

Product form : Substance

Name : Methyl chloride (Refrigerant gas R 40)

CAS No : 74-87-3

Formula : CH3Cl

Other means of identification : methylchloride, halocarbon 40, monochoromethane

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Industrial use. Use as directed.

1.3. Details of the supplier of the safety data sheet

Praxair, Inc.
10 Riverview Drive
Danbury, CT 06810-6268 - USA
T 1-800-772-9247 (1-800-PRAXAIR) - F 1-716-879-2146
www.praxair.com

1.4. Emergency telephone number

Emergency number : Onsite Emergency: 1-800-645-4633

CHEMTREC, 24hr/day 7days/week
— Within USA: 1-800-424-9300, Outside USA: 001-703-527-3887
(collect calls accepted, Contract 17729)

SECTION 2: Hazard identification

2.1. Classification of the substance or mixture

GHS-US classification

Flam. Gas 1	H220
Liquefied gas	H280
Acute Tox. 4 (Inhalation:gas)	H332
Carc. 2	H351
STOT RE 2	H373

2.2. Label elements

GHS-US labeling

Hazard pictograms (GHS-US) :



GHS02 GHS04 GHS07 GHS08

Signal word (GHS-US) : DANGER

Hazard statements (GHS-US) : H220 - **EXTREMELY FLAMMABLE GAS**
H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
H332 - HARMFUL IF INHALED
H351 - SUSPECTED OF CAUSING CANCER
H373 - MAY CAUSE DAMAGE TO ORGANS (LUNG, KIDNEYS, LIVER, CENTRAL NERVOUS SYSTEM) THROUGH PROLONGED OR REPEATED EXPOSURE
CGA-HG04 - MAY FORM EXPLOSIVE MIXTURES WITH AIR
CGA-HG01 - MAY CAUSE FROSTBITE

Precautionary statements (GHS-US) : P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P210 - Keep away from Heat, Open flames, Sparks, Hot surfaces. - No smoking
P260 - Do not breathe gas

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P262 - Do not get in eyes, on skin, or on clothing
P271+P403 - Use and store only outdoors or in a well-ventilated place
P280+P284 - Wear protective gloves, protective clothing, eye protection, respiratory protection, and/or face protection
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely
P381 - Eliminate all ignition sources if safe to do so
P405 - Store locked up
P501 - Dispose of contents/container in accordance with container Supplier/owner instructions
CGA-PG05 - Use a back flow preventive device in the piping
CGA-PG12 - Do not open valve until connected to equipment prepared for use
CGA-PG06 - Close valve after each use and when empty
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F)

2.3. Other hazards

Other hazards not contributing to the classification : Contact with liquid may cause cold burns/frostbite.

2.4. Unknown acute toxicity (GHS US)

No data available

SECTION 3: Composition/Information on ingredients

3.1. Substance

Name	Product identifier	%
Methyl chloride (Refrigerant gas R 40) (Main constituent)	(CAS No) 74-87-3	100

3.2. Mixture

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician.

First-aid measures after skin contact : The liquid may cause frostbite. For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). Water temperature should be tolerable to normal skin. Maintain skin warming for at least 15 minutes or until normal coloring and sensation have returned to the affected area. In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately.

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed

No additional information available

4.3. Indication of any immediate medical attention and special treatment needed

Obtain medical assistance.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Carbon dioxide, Dry chemical, Water spray or fog. Use extinguishing media appropriate for surrounding fire.

5.2. Special hazards arising from the substance or mixture

Fire hazard : **EXTREMELY FLAMMABLE GAS**. If venting or leaking gas catches fire, do not extinguish flames. Flammable vapors may spread from leak, creating an explosive reignition hazard. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Before entering an area, especially a confined area, check the atmosphere with an appropriate device.

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Explosion hazard	:	**EXTREMELY FLAMMABLE GAS**. Forms explosive mixtures with air and oxidizing agents.
Reactivity	:	No reactivity hazard other than the effects described in sub-sections below.

5.3. Advice for firefighters

Firefighting instructions	:	**DANGER! Toxic, flammable liquefied gas** Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.
Special protective equipment for fire fighters	:	Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.
Other information	:	Containers are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures	:	**DANGER: Flammable, liquefied gas.** FORMS EXPLOSIVE MIXTURES WITH AIR. Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Remove all sources of ignition if safe to do so. Reduce vapors with fog or fine water spray, taking care not to spread liquid with water. Shut off flow if safe to do so. Ventilate area or move container to a well-ventilated area. Flammable vapors may spread from leak and could explode if reignited by sparks or flames. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with an appropriate device.

6.1.1. For non-emergency personnel

No additional information available

6.1.2. For emergency responders

No additional information available

6.2. Environmental precautions

Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

6.3. Methods and material for containment and cleaning up

No additional information available

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling	:	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only non-sparking tools. Use only explosion-proof equipment Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g, wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.

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7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Store only where temperature will not exceed 125°F (52°C). Post “No Smoking/No Open Flames” signs in storage and use areas. There must be no sources of ignition. Separate packages and protect against potential fire and/or explosion damage following appropriate codes and requirements (e.g, NFPA 30, NFPA 55, NFPA 70, and/or NFPA 221 in the U.S.) or according to requirements determined by the Authority Having Jurisdiction (AHJ). Always secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand when the container is not in use. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods. For other precautions in using this product, see section 16

OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Methyl chloride (Refrigerant gas R 40) (74-87-3)		
ACGIH	ACGIH TLV-TWA (ppm)	50 ppm
ACGIH	ACGIH TLV-STEL (ppm)	100 ppm
USA OSHA	OSHA PEL (TWA) (ppm)	100 ppm
USA OSHA	OSHA PEL (Ceiling) (ppm)	200 ppm
USA IDLH	US IDLH (mg/m³)	≈ mg/m³
USA IDLH	US IDLH (ppm)	2000 ppm

8.2. Exposure controls

Appropriate engineering controls : Use an explosion-proof local exhaust system. Local exhaust and general ventilation must be adequate to meet exposure standards. MECHANICAL (GENERAL): **Inadequate - Use only in a closed system.** Use explosion proof equipment and lighting. A canopy-type, forced-draft fume hood is preferred.

Eye protection : Wear safety glasses when handling cylinders; vapor-proof goggles and a face shield during cylinder changeout or whenever contact with product is possible. Select eye protection in accordance with OSHA 29 CFR 1910.133.

Skin and body protection : Wear metatarsal shoes and work gloves for cylinder handling, and protective clothing where needed. Wear appropriate chemical gloves during cylinder changeout or wherever contact with product is possible. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138.

Respiratory protection : When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable). Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).

Thermal hazard protection : Wear cold insulating gloves when transfilling or breaking transfer connections.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Gas

Appearance : Colorless gas.

Molecular mass : 50.5 g/mol

Color : Colorless.

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Odor	:	Sweetish. Ethereal.
Odor threshold	:	< 0.01 ppm
pH	:	Not applicable.
Relative evaporation rate (butyl acetate=1)	:	No data available
Relative evaporation rate (ether=1)	:	Not applicable.
Melting point	:	-97.7 °C (-143.86°F)
Freezing point	:	No data available
Boiling point	:	-24.2 °C (-11.6°F)
Flash point	:	Not applicable.
Critical temperature	:	143.1 °C (289.6°F)
Auto-ignition temperature	:	632 °C (1170°F)
Decomposition temperature	:	No data available
Flammability (solid, gas)	:	8.1 - 17.4 vol %
Vapor pressure	:	5.1 bar (73.4 psia)(@21.1°C/70°F)
Critical pressure	:	66.5 bar (966 psia)
Relative vapor density at 20 °C	:	No data available
Relative density	:	0.92 (at 20°C/68°F)
Density	:	0.921 g/cm³ (at 20 °C)
Relative gas density	:	1.743 (at 21.1°C/70°F, 1 atm)
Solubility	:	Water: 6310 mg/l
Log Pow	:	0.91
Log Kow	:	Not applicable.
Viscosity, kinematic	:	Not applicable.
Viscosity, dynamic	:	Not applicable.
Explosive properties	:	Not applicable.
Oxidizing properties	:	None.
Explosion limits	:	No data available

9.2. Other information

Gas group	:	Liquefied gas
Additional information	:	Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level

SECTION 10: Stability and reactivity

10.1. Reactivity

No reactivity hazard other than the effects described in sub-sections below.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

May occur.

10.4. Conditions to avoid

Avoid temperature above 752°F (400°C).

10.5. Incompatible materials

May react with aluminium. Reaction with aluminum may form pyrophoric trimethyl aluminum or aluminum alkyls. Oxidizing agents. Magnesium. Zinc. Potassium. Sodium. Aluminum chloride. Ethylene. Moisture. Rubber.

10.6. Hazardous decomposition products

Carbon dioxide. Carbon monoxide. Chlorine. On heating/burning: release of toxic and corrosive gases/vapors hydrogen chloride : formation of small quantities of phosgene.

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SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Inhalation:gas: HARMFUL IF INHALED.

Methyl chloride (Refrigerant gas R 40) (\f)74-87-3	
LD50 oral rat	1800 mg/kg
LC50 inhalation rat (mg/l)	5300 mg/m³ (Exposure time: 4 h)
LC50 inhalation rat (ppm)	8300 ppm/1h
ATE US (oral)	1800.000 mg/kg body weight
ATE US (gases)	8300.000 ppm/1h

Skin corrosion/irritation : Not classified

pH: Not applicable.

Serious eye damage/irritation : Not classified

pH: Not applicable.

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : SUSPECTED OF CAUSING CANCER.

Methyl chloride (Refrigerant gas R 40) (74-87-3)	
IARC group	3 - Not classifiable

Reproductive toxicity : Not classified

Specific target organ toxicity (single exposure) : Not classified

Specific target organ toxicity (repeated exposure) : MAY CAUSE DAMAGE TO ORGANS (LUNG, KIDNEYS, LIVER, CENTRAL NERVOUS SYSTEM) THROUGH PROLONGED OR REPEATED EXPOSURE.

Aspiration hazard : Not classified

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : No known ecological damage caused by this product.

Methyl chloride (Refrigerant gas R 40) (74-87-3)	
LC50 fish 1	550 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static])

12.2. Persistence and degradability

Methyl chloride (Refrigerant gas R 40) (74-87-3)	
Persistence and degradability	The substance is biodegradable. Unlikely to persist.

12.3. Bioaccumulative potential

Methyl chloride (Refrigerant gas R 40) (74-87-3)	
Log Pow	0.91
Log Kow	Not applicable.
Bioaccumulative potential	Not expected to bioaccumulate due to the low log Kow (log Kow < 4). Refer to section 9.

12.4. Mobility in soil

Methyl chloride (Refrigerant gas R 40) (74-87-3)	
Mobility in soil	No data available.
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5. Other adverse effects

Other adverse effects : May cause pH changes in aqueous ecological systems.

Effect on ozone layer : None

Global warming potential [CO2=1] : 13

Effect on the global warming : Contains Fluorinated greenhouse gases covered by the Kyoto protocol

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SECTION 13: Disposal considerations

13.1. Waste treatment methods

Regional legislation (waste) : U.S. - RCRA (Resource Conservation & Recovery Act) - Basis for Listing - Appendix VII. U.S. - RCRA (Resource Conservation & Recovery Act) - Constituents for Detection Monitoring. U.S. - RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261. U.S. - RCRA (Resource Conservation & Recovery Act) - List for Hazardous Constituents. U.S. - RCRA (Resource Conservation & Recovery Act) - Part 268 Appendix III - Halogenated Organic Compounds (HOCs). U.S. - RCRA (Resource Conservation & Recovery Act) - Phase 4 LDR Rule - Universal Treatment Standards. U.S. - RCRA (Resource Conservation & Recovery Act) - TSD Facilities Ground Water Monitoring. U.S. - RCRA (Resource Conservation & Recovery Act) - U Series Wastes - Acutely Toxic Wastes & Other Hazardous Characteristics.

Waste disposal recommendations : Do not attempt to dispose of residual or unused quantities. Return container to supplier.

SECTION 14: Transport information

In accordance with DOT

Transport document description : UN1063 Methyl chloride, 2.1

UN-No.(DOT) : UN1063

Proper Shipping Name (DOT) : Methyl chloride

Class (DOT) : 2.1 - Class 2.1 - Flammable gas 49 CFR 173.115

Hazard labels (DOT) : 2.1 - Flammable gas



DOT Special Provisions (49 CFR 172.102) : N86 - UN pressure receptacles made of aluminum alloy are not authorized
T50 - When portable tank instruction T50 is referenced in Column (7) of the 172.101 Table, the applicable liquefied compressed gases are authorized to be transported in portable tanks in accordance with the requirements of 173.313 of this subchapter

Additional information

Emergency Response Guide (ERG) Number : 115

Other information : No supplementary information available.

Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers: - Ensure there is adequate ventilation. - Ensure that containers are firmly secured. - Ensure cylinder valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

Transport by sea

UN-No. (IMDG) : 1063

Proper Shipping Name (IMDG) : METHYL CHLORIDE (REFRIGERANT GAS R 40)

Class (IMDG) : 2 - Gases

MFAG-No : 115

Air transport

UN-No. (IATA) : 1063

Proper Shipping Name (IATA) : Methyl chloride

Class (IATA) : 2

Civil Aeronautics Law : Gases under pressure/Gases flammable under pressure

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SECTION 15: Regulatory information

15.1. US Federal regulations

Methyl chloride (Refrigerant gas R 40) (74-87-3)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Subject to reporting requirements of United States SARA Section 313	
CERCLA RQ	100 lb
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard Delayed (chronic) health hazard Sudden release of pressure hazard Fire hazard
SARA Section 313 - Emission Reporting	1.0 %

15.2. International regulations

CANADA

Methyl chloride (Refrigerant gas R 40) (74-87-3)
Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations

Methyl chloride (Refrigerant gas R 40) (74-87-3)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

15.2.2. National regulations

Methyl chloride (Refrigerant gas R 40) (74-87-3)
Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory Listed on the Korean ECL (Existing Chemicals List) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Japanese Poisonous and Deleterious Substances Control Law Japanese Pollutant Release and Transfer Register Law (PRTR Law) Listed on the Canadian IDL (Ingredient Disclosure List) Listed on INSQ (Mexican National Inventory of Chemical Substances)

15.3. US State regulations

Methyl chloride (Refrigerant gas R 40)(74-87-3)	
U.S. - California - Proposition 65 - Carcinogens List	No
U.S. - California - Proposition 65 - Developmental Toxicity	Yes
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	Yes
State or local regulations	U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List U.S. - Pennsylvania - RTK (Right to Know) List

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SECTION 16: Other information

Other information : When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Before using any plastics, confirm their compatibility with this product

Praxair asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information

The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Praxair, Inc, it is the user's obligation to determine the conditions of safe use of the product

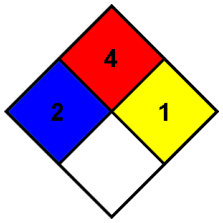
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NFPA health hazard : 2 - Intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical attention is given.

NFPA fire hazard : 4 - Will rapidly or completely vaporize at normal pressure and temperature, or is readily dispersed in air and will burn readily.

NFPA reactivity : 1 - Normally stable, but can become unstable at elevated temperatures and pressures or may react with water with some release of energy, but not violently.



HMIS III Rating

Health : 2 Moderate Hazard - Temporary or minor injury may occur

Flammability : 4 Severe Hazard

Physical : 2 Moderate Hazard

SDS US (GHS HazCom 2012) - Praxair

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

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MATHESON
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Safety Data Sheet

Material Name METHYL CHLOROFORM **SDS ID: MAT14370**

* * *Section 1 - IDENTIFICATION* * *

Product Identifier: METHYL CHLOROFORM

Trade Names/Synonyms

MTG MSDS 219; 1,1,1-TRICHLOROETHANE; ALPHA-TRICHLOROETHANE; AEROTHENE TT; METHYLTRICHLOROMETHANE; METHYLCHLOROFORM; TRICHLOROMETHYLMETHANE; TRICHLOROETHANE; ETHANE, 1,1,1-TRICHLOROETHANE; CHLORTEN; 1,1,1-TRICHLORETHANE; UN 2831; C2H3Cl3

Chemical Family

halogenated, aliphatic

Recommended Use

industrial

Restrictions on Use

None known.

Manufacturer Information

MATHESON TRI-GAS, INC.
150 Allen Road, Suite 302
Basking Ridge, NJ 07920

General Information: 1-800-416-2505
Emergency #: 1-800-424-9300 (CHEMTREC)
Outside the US: 703-527-3887 (Call collect)

* * *Section 2 - HAZARDS IDENTIFICATION* * *

Classification in accordance with 29 CFR 1910.1200

Acute Toxicity (Inhalation), Category 4
Skin Corrosion / Irritation, Category 2
Eye Damage / Irritation, Category 2A
Toxic to Reproduction, Category 2
Specific Target Organ Toxicity - Single Exposure, Category 1 (central nervous system and heart)
Specific Target Organ Toxicity - Single Exposure, Category 3 (respiratory system)
Specific Target Organ Toxicity - Repeated Exposure, Category 1 (central nervous system, heart, and liver)
Specific Target Organ Toxicity - Repeated Exposure, Category 2 (brain, lungs, and nervous system)
Hazardous to the Aquatic Environment - Acute Hazard, Category 2
Hazardous to the Aquatic Environment - Chronic Hazard, Category 2
Hazardous for the ozone layer, Category 1

GHS LABEL ELEMENTS

Symbol(s)



Signal Word

DANGER

Hazard Statement(s)

Harmful if inhaled
Causes skin irritation
Causes serious eye irritation
Suspected of damaging fertility or the unborn child
Causes damage to central nervous system and heart.
May cause respiratory tract irritation.
Causes damage to central nervous system, heart, and liver through prolonged or repeated exposure.
May cause damage to brain, lungs, nervous system through prolonged or repeated exposure.
Toxic to aquatic life with long lasting effects
Harms public health and the environment by destroying ozone in the upper atmosphere

Precautionary Statement(s)

Prevention

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Do not breathe vapor or mist. Use only outdoors or in a well-ventilated area. Wear protective gloves and eye/face protection. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid release to the environment.

Response

IF exposed: Call a POISON CENTER or doctor/physician. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell. IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. Collect spillage.

Storage

Store in a well-ventilated place. Keep container tightly closed. Store locked up.

Disposal

Dispose of in accordance with applicable regulations.
Refer to manufacturer/supplier for information on recovery/recycling.

* * *Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS* * *

CAS	Component	Percent
71-55-6	METHYL CHLOROFORM	100

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Trichloroethane (25323-89-1).

* * *Section 4 - FIRST AID MEASURES* * *

Description of Necessary Measures

Inhalation

If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

Skin

Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

Eyes

Flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Then get immediate medical attention.

Ingestion

If vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

Most Important Symptoms/Effects

Acute

respiratory tract irritation, skin irritation, eye irritation, central nervous system depression, central nervous system damage, heart damage

Delayed

central nervous system damage, heart damage, liver damage, reproductive effects, lung damage, brain damage, nervous system damage

Indication of Immediate Medical Attention and Special Treatment

For inhalation, consider oxygen.

* * *Section 5 - FIRE FIGHTING MEASURES* * *

Suitable Extinguishing Media

carbon dioxide, regular dry chemical, water spray

Large fires: Use dry chemical, carbon dioxide, alcohol-resistant foam or water spray.

Unsuitable Extinguishing Media

Do not scatter spilled material with high-pressure water streams.

Specific Hazards Arising from the Chemical

Slight fire hazard.

Hazardous Combustion Products

Combustion: hydrogen chloride, phosgene, oxides of carbon

Fire Fighting Measures

Move container from fire area if it can be done without risk. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with water spray until well after the fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. Stay away from the ends of tanks. For tank, rail car or tank truck, evacuation radius: 800 meters (1/2 mile).

Special Protective Equipment and Precautions for Firefighters

Wear full protective fire fighting gear including self contained breathing apparatus (SCBA) for protection against possible exposure.

* * *Section 6 - ACCIDENTAL RELEASE MEASURES* * *

Personal Precautions, Protective Equipment and Emergency Procedures

Wear personal protective clothing and equipment, see Section 8. Avoid release to the environment.

Methods and Materials for Containment and Cleaning Up

Avoid heat, flames, sparks and other sources of ignition. Eliminate all ignition sources if safe to do so. Stop leak if possible without personal risk. **Small spills:** Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. **Large spills:** Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

* * *Section 7 - HANDLING AND STORAGE* * *

Precautions for Safe Handling

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Do not breathe vapor or mist. Use only outdoors or in a well-ventilated area. Wear protective gloves and eye/face protection. Wash thoroughly after handling. Do not eat, drink, or smoke when using this product. Avoid release to the environment.

Conditions for Safe Storage, including any Incompatibilities

Store and handle in accordance with all current regulations and standards. Store in a well-ventilated place. Keep container tightly closed. Store locked up. Store in a cool, dry place. Keep separated from incompatible substances.

Incompatibilities combustible materials, bases, metals, oxidizing materials

* * *Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION* * *

Component Exposure Limits

METHYL CHLOROFORM (71-55-6)

ACGIH:	350 ppm TWA
	450 ppm STEL
Europe:	100 ppm TWA; 555 mg/m3 TWA
	200 ppm STEL; 1110 mg/m3 STEL
OSHA (Final):	350 ppm TWA; 1900 mg/m3 TWA
OSHA (Vacated):	350 ppm TWA; 1900 mg/m3 TWA
	450 ppm STEL; 2450 mg/m3 STEL
NIOSH:	350 ppm Ceiling (15 min); 1900 mg/m3 Ceiling (15 min)

Component Biological Limit Values

METHYL CHLOROFORM (71-55-6)

ACGIH: 40 ppm Medium: end-exhaled air Time: prior to last shift of workweek Parameter: Methyl chloroform; 10 mg/L Medium: urine Time: end of workweek Parameter: Trichloroacetic acid (nonspecific, semi-quantitative); 30 mg/L Medium: urine Time: end of shift at end of workweek Parameter: Total trichloroethanol (nonspecific, semi-quantitative); 1 mg/L Medium: blood Time: end of shift at end of workweek Parameter: Total trichloroethanol (nonspecific)

IDLH

700 ppm

Appropriate Engineering Controls

Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

Individual Protection Measures, such as Personal Protective Equipment

Eyes/Face Protection

Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin Protection

Wear appropriate chemical resistant clothing.

Glove Recommendations

Wear appropriate chemical resistant gloves.

Respiratory Protection

The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

700 ppm

Any supplied-air respirator.

Any self-contained breathing apparatus with a full facepiece.
Emergency or planned entry into unknown concentrations or IDLH conditions -
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
Escape -
Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister.
Any appropriate escape-type, self-contained breathing apparatus.

* * *Section 9 - PHYSICAL AND CHEMICAL PROPERTIES* * *

Physical State:	Liquid	**Appearance:**	clear, colorless liquid
Color:	colorless	**Physical Form:**	volatile liquid
Odor:	sweet odor	**Odor Threshold:**	44 - 100 ppm
pH:	Not available	**Melting/Freezing Point:**	-32 °C
Boiling Point:	74 °C	**Flash Point:**	>93.3 °C
Decomposition:	Not available	**Evaporation Rate:**	5.0 (butyl acetate=1)
LEL:	7.5 %	**UEL:**	12.5 %
Vapor Pressure:	100 mmHg @ 20 °C	**Henry's Law Constant:**	0.072 atm-cu m/mole @ 25°C
Vapor Density (air = 1):	4.55	**Specific Gravity (water=1):**	1.3390
Water Solubility:	0.078 % @ 25 °C	**Log KOW:**	2.49
KOC:	17823.79 estimated from water solubility	**Auto Ignition:**	537 °C
Viscosity:	0.858 cP @20 °C	**Volatility:**	100%
Molecular Weight:	133.40	**Molecular Formula:**	C-H3-C-Cl3

Other Property Information

No additional information is available.

Solvent Solubility

Soluble: acetone, benzene, chloroform, methanol, ethanol, carbon disulfide, ether, carbon tetrachloride, heptane

* * *Section 10 - STABILITY AND REACTIVITY* * *

Reactivity

No reactivity hazard is expected.

Chemical Stability

Stable at normal temperatures and pressure.

Possibility of Hazardous Reactions

Will not polymerize.

Conditions to Avoid

Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat.

Incompatible Materials

combustible materials, bases, metals, oxidizing materials

Hazardous Decomposition

Combustion: hydrogen chloride, phosgene, oxides of carbon

* * *Section 11 - TOXICOLOGICAL INFORMATION* * *

Acute and Chronic Toxicity

Component Analysis - LD50/LC50

The components of this material have been reviewed in various sources and the following selected endpoints are published:

METHYL CHLOROFORM (71-55-6)

Dermal LD50 Rabbit >15800 mg/kg; Inhalation LC50 Rat 18000 ppm 4 h; Oral LD50 Rat >2000 mg/kg

RTECS Acute Toxicity (selected)

The components of this material have been reviewed, and RTECS publishes the following endpoints:

METHYL CHLOROFORM (71-55-6)

Inhalation: 24400 mg/m3 Inhalation Cat LC50; 29492 ppm/10 minute(s) Inhalation Mouse LC50; 3911 ppm/2 hour Inhalation Mouse LC50
20000 ppm/2 hour Inhalation Rat LC50; 14250 ppm/7 hour Inhalation Rat LC50; 17000 ppm/4 hour Inhalation Rat LC50

Acute Toxicity Level

METHYL CHLOROFORM (71-55-6)

Slightly Toxic: inhalation, dermal absorption, ingestion

Information on Likely Routes of Exposure

Inhalation

irritation, changes in blood pressure, nausea, vomiting, diarrhea, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, mood swings, loss of coordination, blood disorders, heart disorders, kidney damage, liver damage, convulsions, unconsciousness, coma, heart damage, reproductive effects

Ingestion

irritation, nausea, vomiting, diarrhea, stomach pain, irregular heartbeat, headache, drowsiness, dizziness, disorientation, loss of coordination, kidney damage, liver damage, convulsions, unconsciousness, coma, reproductive effects

Skin Contact

irritation (possibly severe)

Eye Contact

irritation

Immediate Effects

respiratory tract irritation, skin irritation, eye irritation, central nervous system depression, central nervous system damage, heart damage

Delayed Effects

central nervous system damage, heart damage, liver damage, reproductive effects, brain damage, lung damage, nervous system damage

Medical Conditions Aggravated by Exposure

heart or cardiovascular disorders, kidney disorders, liver disorders, skin disorders and allergies

Irritation/Corrosivity Data

respiratory tract irritation, skin irritation, eye irritation

RTECS Irritation

The components of this material have been reviewed, and RTECS publishes the following endpoints:

METHYL CHLOROFORM (71-55-6)

450 ppm/8 hour Eyes Man; 100 mg Eyes Rabbit mild; 2 mg/24 hour Eyes Rabbit severe; 5 gm/12 day(s) intermittent Skin Rabbit mild; 20 mg/24 hour Skin Rabbit moderate

Local Effects

METHYL CHLOROFORM (71-55-6)

Irritant: inhalation, skin, eye

Target Organs

METHYL CHLOROFORM (71-55-6)

central nervous system

Respiratory Sensitization

No data available.

Dermal Sensitization

No data available.

Carcinogenicity

Component Carcinogenicity

METHYL CHLOROFORM (71-55-6)

ACGIH: A4 - Not Classifiable as a Human Carcinogen

IARC: Monograph 71 [1999]; Supplement 7 [1987]; Monograph 20 [1979] (Group 3 (not classifiable))

RTECS Mutagenic

The components of this material have been reviewed, and RTECS publishes data for one or more components.

Reproductive Effects Data

Available data characterizes this substance as a reproductive hazard.

RTECS Reproductive Effects

The components of this material have been reviewed, and RTECS publishes the following endpoints:

METHYL CHLOROFORM (71-55-6)

2100 ppm Inhalation Rat TCLo (6 hour, pregnant 1-20 day(s)); 7000 ppm Inhalation Rat TCLo (3 hour, pregnant 13-19 day(s)); 43 mg/kg Oral Rat TDLo (pregnant 1-22 day(s), 21 day(s))

RTECS Tumorigenic

The components of this material have been reviewed, and RTECS publishes data for one or more components.

Additional Data

Alcohol may enhance the toxic effects. Stimulants such as epinephrine may induce ventricular fibrillation.

Specific Target Organ Toxicity - Single Exposure

central nervous system, heart, respiratory system

Specific Target Organ Toxicity - Repeated Exposure

central nervous system, heart, liver, brain, lungs, nervous system

Aspiration Hazard

Not expected to be an aspiration hazard.

* * *Section 12 - ECOLOGICAL INFORMATION* * *

Ecotoxicity

Toxic to aquatic life with long lasting effects.

Component Analysis - Aquatic Toxicity

METHYL CHLOROFORM (71-55-6)

Fish: 96 Hr LC50 Pimephales promelas: 35.2 - 50.7 mg/L [flow-through]; 96 Hr LC50 Lepomis macrochirus: 57 - 90 mg/L [static] (juvenile); 96 Hr LC50 Cyprinus carpio: 56 mg/L [flow-through]; 96 Hr LC50 Poecilia reticulata: 52.9 mg/L [flow-through]; 96 Hr LC50 Poecilia reticulata: 69.7 mg/L [static]; 96 Hr LC50 Pimephales promelas: 91 - 126 mg/L [static]; 96 Hr LC50 Oncorhynchus mykiss: 46 - 59 mg/L [static]

Algae: 96 Hr EC50 Pseudokirchneriella subcapitata: >500 mg/L

Invertebrate: 48 Hr LC50 Daphnia magna: >530 mg/L; 48 Hr EC50 Daphnia magna: 2384 mg/L; 48 Hr EC50 Daphnia magna: 9.7 - 12.8 mg/L [Static]

Persistence and Degradability

This material may biodegrade in soil and water.

Bioaccumulative Potential

Bioconcentration potential in aquatic organisms is low based on BCF value of 0.7-4.9.

Mobility

Expected to have high mobility in soil.

* * *Section 13 - DISPOSAL CONSIDERATIONS* * *

Disposal Methods

Dispose in accordance with all applicable regulations.

Component Waste Numbers

METHYL CHLOROFORM (71-55-6)

RCRA: waste number U226

* * *Section 14 - TRANSPORT INFORMATION* * *

US DOT Information

Shipping Name: 1,1,1-Trichloroethane
UN/NA #: UN2831 **Hazard Class:** 6.1 **Packing Group:** III
Required Label(s): 6.1

IMDG Information

Shipping Name: 1,1,1-Trichloroethane
UN #: UN2831 **Hazard Class:** 6.1 **Packing Group:** III
Required Label(s): 6.1

* * *Section 15 - REGULATORY INFORMATION* * *

Component Analysis

U.S. Federal Regulations

This material contains one or more of the following chemicals required to be identified under SARA Section 302/304 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

METHYL CHLOROFORM (71-55-6)

SARA 313: 1.0 % de minimis concentration

CERCLA: 1000 lb final RQ; 454 kg final RQ

SARA 311/312 Hazardous Categories

Acute Health: Yes **Chronic Health:** Yes **Fire:** No **Pressure:** No **Reactive:** No

U.S. State Regulations

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA
METHYL CHLOROFORM	71-55-6	Yes	Yes	Yes	Yes	Yes

Not regulated under California Proposition 65

Component Analysis - Inventory

Component	CAS	US	CA	EU	AU	PH	JP	KR	CN	NZ
METHYL CHLOROFORM	71-55-6	Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	Yes

* * *Section 16 - OTHER INFORMATION* * *

NFPA Ratings: Health: 2 **Fire:** 1 **Reactivity:** 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Key / Legend

ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSL - Domestic Substances List; EEC - European Economic Community; EINECS - European Inventory of Existing Commercial Chemical Substances; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; JP - Japan; Kow - Octanol/water partition coefficient; KR - Korea; LEL - Lower Explosive Limit; LOLI - List Of LIsts™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PH - Philippines; RCRA - Resource Conservation and Recovery Act; RID - European Rail Transport; RTECS - Registry of Toxic Effects of Chemical Substances®; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States

Other Information

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End of Sheet MAT14370

Methylcyclohexane

Version 1.5 Revision Date 2014-03-20

SECTION 1: Identification of the substance/mixture and of the company/undertaking

Product information

Trade name : Methylcyclohexane
Material : 1098852, 1021714, 1021712, 1028351, 1021711, 1024851, 1028352, 1024850, 1021713

EC-No.Registration number

Chemical Name	CAS-No. EC-No. Index No.	Legal Entity Registration number
Methylcyclohexane	108-87-2 203-624-3 601-018-00-7	01-2119556887-18-XXXX

Relevant Identified Uses Supported : Solvent in other applications
Use in polymer processing – professional, Solvent
Use in coatings – professional, Solvent
Lubricants - Professional, Solvent
Use as a cleaning agent – professional, Solvent
Solvent in other applications- Professional

Company : Chevron Phillips Chemical Company LP
Specialty Chemicals
10001 Six Pines Drive
The Woodlands, TX 77380

Local : Chevron Phillips Chemicals International N.V.
Brusselsesteenweg 355
B-3090 Overijse
Belgium

MSDS Requests: (800) 852-5530
Technical Information: (832) 813-4862
Responsible Party: Product Safety Group
Email:msds@cpchem.com

Emergency telephone:

Health:
866.442.9628 (North America)
1.832.813.4984 (International)
Transport:
North America: CHEMTREC 800.424.9300 or 703.527.3887

Asia: +800 CHEMCALL (+800 2436 2255)
EUROPE: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
South America SOS-Cotec Inside Brazil: 0800.111.767 Outside Brazil: +55.19.3467.1600

Responsible Department	:	Product Safety and Toxicology Group
E-mail address	:	MSDS@CPChem.com
Website	:	www.CPChem.com

SECTION 2: Hazards identification

Classification of the substance or mixture
REGULATION (EC) No 1272/2008

Aspiration hazard, Category 1	H304: May be fatal if swallowed and enters airways.
Skin irritation, Category 2	H315: Causes skin irritation.
Flammable liquids, Category 2	H225: Highly flammable liquid and vapor.
Specific target organ systemic toxicity - single exposure, Category 3 , Central nervous system	H336: May cause drowsiness or dizziness.
Acute toxicity, Category 1	H400: Very toxic to aquatic life.
Chronic aquatic toxicity, Category 2	H411: Toxic to aquatic life with long lasting effects.

Classification (67/548/EEC, 1999/45/EC)

Highly flammable	R11: Highly flammable.
Harmful	R65: Harmful: may cause lung damage if swallowed.
Irritant	R38: Irritating to skin.
Dangerous for the environment	R51/53: Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R67: Vapors may cause drowsiness and dizziness.

Label elements

Labeling (REGULATION (EC) No 1272/2008)

Hazard pictograms :



Signal Word : Danger

Hazard Statements	:	H225 Highly flammable liquid and vapor. H304 May be fatal if swallowed and enters airways. H315 Causes skin irritation. H336 May cause drowsiness or dizziness. H411 Toxic to aquatic life with long lasting effects.
Precautionary Statements	:	**Prevention:**

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P243	Take precautionary measures against static discharge.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.

SECTION 3: Composition/information on ingredients

Synonyms : Cyclohexylmethane
Hexahydrotoluene
MCH
Methylcyclohexane (Pure Grade)

Molecular formula : C7H14

Mixtures

Hazardous ingredients

Chemical Name	CAS-No. EC-No. Index No.	Classification (67/548/EEC)	Classification (REGULATION (EC) No 1272/2008)	Concentration [wt%]
Methylcyclohexane	108-87-2 203-624-3 601-018-00-7	F; R11 Xn; R65 Xi; R38 R67 N; R51-R53	Asp. Tox. 1; H304 Skin Irrit. 2; H315 Flam. Liq. 2; H225 STOT SE 3; H336 Aquatic Acute 1; H400 Aquatic Chronic 2; H411	99,8 - 100

For the full text of the R-phrases mentioned in this Section, see Section 16.
For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

General advice : Move out of dangerous area. Show this material safety data sheet to the doctor in attendance. Material may produce a serious, potentially fatal pneumonia if swallowed or vomited.

If inhaled : Consult a physician after significant exposure. If unconscious place in recovery position and seek medical advice.

In case of skin contact : If on skin, rinse well with water. If on clothes, remove clothes.

In case of eye contact : Flush eyes with water as a precaution. Remove contact

		lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.
If swallowed	:	Keep respiratory tract clear. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.

SECTION 5: Firefighting measures

Flash point	:	-5,5 °C (22,1 °F) Method: Tagliabue Open Cup
Autoignition temperature	:	285 °C (545 °F)
Suitable extinguishing media	:	Alcohol-resistant foam. Carbon dioxide (CO2). Dry chemical.
Unsuitable extinguishing media	:	High volume water jet.
Specific hazards during fire fighting	:	Do not allow run-off from fire fighting to enter drains or water courses.
Special protective equipment for fire-fighters	:	Wear self contained breathing apparatus for fire fighting if necessary.
Further information	:	Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. For safety reasons in case of fire, cans should be stored separately in closed containments. Use a water spray to cool fully closed containers.
Fire and explosion protection	:	Do not spray on an open flame or any other incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.
Hazardous decomposition products	:	Hydrocarbons. Carbon oxides.

SECTION 6: Accidental release measures

Personal precautions	:	Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.
Environmental precautions	:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods for cleaning up	:	Contain spillage, and then collect with non-combustible

absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

SECTION 7: Handling and storage

Handling

Advice on safe handling : Avoid formation of aerosol. Do not breathe vapors/dust. Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Take precautionary measures against static discharges. Provide sufficient air exchange and/or exhaust in work rooms. Open drum carefully as content may be under pressure. Dispose of rinse water in accordance with local and national regulations.

Advice on protection against fire and explosion : Do not spray on an open flame or any other incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.

Storage

Requirements for storage areas and containers : No smoking. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.

SECTION 8: Exposure controls/personal protection

Ingredients with workplace control parameters

SK

Súčast	Podstata	Hodnota	Kontrolné parametre	Poznámka
METHYLCYCLOHEXANE	SK OEL	NPEL priemerný	200 ppm, 810 mg/m3	
	SK OEL	NPEL krátkodobý	400 ppm, 1.620 mg/m3	

SI

Komponente	Osnova	Vrednost	Parametri nadzora	Pripomba
METHYLCYCLOHEXANE	SI OEL	MV	500 ppm, 2.000 mg/m3	

PT

Componentes	Bases	Valor	Parâmetros de controlo	Nota
METHYLCYCLOHEXANE	PT OEL	VLE-MP	400 ppm,	

PL

Składniki	Podstawa	Wartość	Parametry dotyczące kontroli	Uwaga
METHYLCYCLOHEXANE	PL NDS	NDS	1.600 mg/m3	
	PL NDS	NDSch	3.000 mg/m3	

NO

Komponenter	Grunnlag	Verdi	Kontrollparametere	Nota
METHYLCYCLOHEXANE	AN 361	TWA	200 ppm, 800 mg/m3	

LT

Komponentai	Pagrindas, bazė	Vertė	Kontrolės parametrai	Pastaba
METHYLCYCLOHEXANE	LT OEL	IPRD	50 mg/m3	

IE

Ingredients	Basis	Value	Control parameters	Note
Methylcyclohexane	IE OEL	OELV - 8 hrs (TWA)	400 ppm, 1.600 mg/m3	

GR

Συστατικά	Βάση	Τιμή	Παράμετροι ελέγχου	Σημείωση
METHYLCYCLOHEXANE	GR OEL	TWA	500 ppm, 2.000 mg/m3	
	GR OEL	STEL	500 ppm, 2.000 mg/m3	

FR

Composants	Base	Valeur	Paramètres de contrôle	Note
METHYLCYCLOHEXANE	FR VLE	VME	400 ppm, 1.600 mg/m3	normal,

normal Valeurs limites indicatives

FI

Aineosat	Peruste	Arvo	Valvontaa koskevat muuttujat	Huomautus
METHYLCYCLOHEXANE	FI OEL	HTP-arvot 8h	400 ppm, 1.600 mg/m3	
	FI OEL	HTP-arvot 15 min	500 ppm, 2.000 mg/m3	

ES

Componentes	Base	Valor	Parámetros de control	Nota
METHYLCYCLOHEXANE	ES VLA	VLA-ED	400 ppm, 1.630 mg/m3	

EE

Komponendid, osad	Alused	Väärtus	Kontrolliparameetrid	Märkused
METHYLCYCLOHEXANE	EE OEL	Piirnorm	400 ppm, 1.600 mg/m3	

DK

Komponenter	Basis	Værdi	Kontrolparametre	Note
METHYLCYCLOHEXANE	DK OEL	GV	200 ppm, 805 mg/m3	

DE

Inhaltsstoffe	Grundlage	Wert	Zu überwachende Parameter	Bemerkung
METHYLCYCLOHEXANE	DE TRGS 900	AGW	200 ppm, 810 mg/m3	DFG,

DFG Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe der DFG (MAK-Kommission)

CZ

Složky	Základ	Hodnota	Kontrolní parametry	Poznámka
METHYLCYCLOHEXANE	CZ OEL	PEL	1.500 mg/m3	I,
	CZ OEL	NPK-P	2.000 mg/m3	I,

I dráždí sliznice (oči, dýchací cesty) resp. kůži

CH

Inhaltsstoffe	Grundlage	Wert	Zu überwachende Parameter	Bemerkung
METHYLCYCLOHEXANE	CH SUVA	MAK-wert	400 ppm, 1.600 mg/m3	
	CH SUVA	STEL	800 ppm, 3.200 mg/m3	

BE

Bestanddelen	Basis	Waarde	Controleparameters	Opmerking
METHYLCYCLOHEXANE	BE OEL	TGG 8 hr	400 ppm, 1.633 mg/m3	

AT

Inhaltsstoffe	Grundlage	Wert	Zu überwachende Parameter	Bemerkung
METHYLCYCLOHEXANE	AT OEL	TMW	400 ppm, 1.600 mg/m3	
	AT OEL	KZW	1.600 ppm, 6.400 mg/m3	

DNEL : End Use: Workers
Routes of exposure: Inhalation
Potential health effects: Systemic effects
Value: 64,3 mg/m3

DNEL : End Use: Workers
Routes of exposure: Inhalation
Potential health effects: Acute effects
Value: 1354,6 mg/m3

DNEL	:	End Use: Workers Routes of exposure: Skin contact Potential health effects: Systemic effects Value: 1,7 mg/kg
PNEC	:	Fresh water Value: 0,00326 mg/l
PNEC	:	Marine water Value: 0,000326 mg/l
PNEC	:	Fresh water sediment Value: 0,088 mg/kg
PNEC	:	Marine sediment Value: 0,0088 mg/kg
PNEC	:	Soil Value: 0,127 mg/kg

Engineering measures

Adequate ventilation to control airborned concentrations below the exposure guidelines/limits. Consider the potential hazards of this material (see Section 2), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

Personal protective equipment

Respiratory protection	:	Wear a supplied-air NIOSH approved respirator unless ventilation or other engineering controls are adequate to maintain minimal oxygen content of 19.5% by volume under normal atmospheric pressure. Wear a NIOSH approved respirator that provides protection when working with this material if exposure to harmful levels of airborne material may occur, such as:. Air-Purifying Respirator for Organic Vapors. Use a positive pressure, air-supplying respirator if there is potential for uncontrolled release, exposure levels are not known, or other circumstances where air-purifying respirators may not provide adequate protection.
Hand protection	:	The suitability for a specific workplace should be discussed with the producers of the protective gloves. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.
Eye protection	:	Eye wash bottle with pure water. Tightly fitting safety goggles.
Skin and body protection	:	Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. Wear as appropriate:. Flame retardant

protective clothing. Footwear protecting against chemicals.

Hygiene measures : When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday.

For additional details, see the Exposure Scenario in the Annex portion

SECTION 9: Physical and chemical properties

Information on basic physical and chemical properties

Appearance

Form	:	Liquid
Physical state	:	Liquid
Color	:	Colorless
Odor	:	Mild

Safety data

Flash point	:	-5,5 °C (22,1 °F) Method: Tagliabue Open Cup
Lower explosion limit	:	1,2 %(V)
Upper explosion limit	:	6,7 %(V)
Oxidizing properties	:	no
Autoignition temperature	:	285 °C (545 °F)
Molecular formula	:	C7H14
Molecular weight	:	98,21 g/mol
pH	:	No data available
Freezing point	:	-127 °C (-197 °F)
Boiling point/boiling range	:	100,4 °C (212,7 °F)
Vapor pressure	:	1,60 PSI at 37,8 °C (100,0 °F)
Relative density	:	0,774, 15,6 °C(60,1 °F)
Density	:	771,7 g/l
Water solubility	:	Negligible
Viscosity, dynamic	:	0,732 cP
Relative vapor density	:	3 (Air = 1.0)
Evaporation rate	:	1
Percent volatile	:	> 99 %

SECTION 10: Stability and reactivity

Chemical stability : This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Possibility of hazardous reactions

Conditions to avoid : Heat, flames and sparks.

Materials to avoid : May react with oxygen and strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

Other data : No decomposition if stored and applied as directed.

SECTION 11: Toxicological information

Acute oral toxicity

Methylcyclohexane : LD50: 4.000 - 4.500 mg/kg
Species: rabbit

Acute inhalation toxicity

Methylcyclohexane : LC50: > 26,3 mg/l
Exposure time: 1 h
Species: mouse
Test atmosphere: vapor

Acute dermal toxicity

Methylcyclohexane : LD50: > 2.000 mg/kg
Species: rabbit
Method: OECD Test Guideline 402
Information given is based on data obtained from similar substances.

Skin irritation

Methylcyclohexane : Skin irritation

Eye irritation

Methylcyclohexane : No eye irritation

Sensitization

Methylcyclohexane : Did not cause sensitization on laboratory animals.

Repeated dose toxicity

Methylcyclohexane : Species: rat, male
Sex: male
Application Route: oral gavage

Dose: 62.5, 250, 1000 mg/kg
Exposure time: 28 d
Number of exposures: daily, 7d/wk
NOEL: 250 mg/kg
Lowest observable effect level: 1.000 mg/kg
Method: OECD Guideline 422

Species: rat, female
Sex: female
Application Route: oral gavage
Dose: 62.5, 250, 1000 mg/kg
Exposure time: 46 d
Number of exposures: daily, 7 d/wk
NOEL: 250 mg/kg
Lowest observable effect level: 1.000 mg/kg
Method: OECD Guideline 422

Reproductive toxicity

Methylcyclohexane : Species: rat
Sex: male
Application Route: oral gavage
Dose: 62.5, 250, 1000 mg/kg
Number of exposures: daily, 7 d/wk
Test period: 28
Method: OECD Guideline 422
NOAEL Parent: 1.000 mg/kg
NOAEL F1: 1.000 mg/kg

Species: rat
Sex: female
Application Route: oral gavage
Dose: 62.5, 250, 1000 mg/kg
Number of exposures: daily, 7 d/wk
Test period: 46
Method: OECD Guideline 422
NOAEL Parent: 1.000 mg/kg
NOAEL F1: 1.000 mg/kg

Species: rat
Sex: male and female
Application Route: inhalation (vapor)
Dose: 500, 2000, 7000 ppm
Number of exposures: daily, 7 d/wk
Test period: 28
Method: OECD Test Guideline 416
NOAEL Parent: 500 ppm
NOAEL F1: 500 ppm
NOAEL F2: 2000 ppm
Information given is based on data obtained from similar substances.

Developmental Toxicity

Methylcyclohexane : Species: rat
Application Route: Inhalation
Dose: 500, 2000, 7000 ppm
Number of exposures: 6 hr/d, 7 d/wk
Test period: GD 7 - 16

Method: OECD Guideline 414
NOAEL Teratogenicity: 7000 ppm
NOAEL Maternal: 500 ppm
Information given is based on data obtained from similar substances.

Species: rabbit
Application Route: Inhalation
Dose: 500, 2000, 7000 ppm
Number of exposures: 6 hr/d, 7 d/wk
Test period: GD 6 - 18
Method: OECD Guideline 414
NOAEL Teratogenicity: 7000 ppm
NOAEL Maternal: 500 ppm
Information given is based on data obtained from similar substances.

Methylcyclohexane
Aspiration toxicity : May be fatal if swallowed and enters airways.

CMR effects

Methylcyclohexane : Carcinogenicity: Not available
Mutagenicity: Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Teratogenicity: Animal testing did not show any effects on fetal development.
Reproductive toxicity: Animal testing did not show any effects on fertility.

Methylcyclohexane
Further information : Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting. Concentrations substantially above the TLV value may cause narcotic effects. Solvents may degrease the skin.

SECTION 12: Ecological information

Toxicity to fish

Methylcyclohexane : LC50: 2,07 mg/l
Exposure time: 96 h
Species: Fish
semi-static test

Toxicity to daphnia and other aquatic invertebrates

Methylcyclohexane : EC50: 0,326 mg/l
Exposure time: 48 h
Species: Daphnia magna (Water flea)
semi-static test

Toxicity to algae

Methylcyclohexane : ErC50: 0,336 mg/l
Exposure time: 72 h
Species: Pseudokirchneriella subcapitata (green algae)

static test

Toxicity to bacteria

Methylcyclohexane : IC50: 29 mg/l
Exposure time: 15 h
Growth inhibition

Biodegradability

Methylcyclohexane : aerobic
0 %
Testing period: 28 d
Method: OECD Test Guideline 301F

Acute aquatic toxicity

Methylcyclohexane : Very toxic to aquatic life.

Chronic aquatic toxicity

Methylcyclohexane : Toxic to aquatic life with long lasting effects.

Toxicity Data on Soil

Methylcyclohexane : No data available

Other organisms relevant to the environment

Methylcyclohexane : No data available

Impact on Sewage Treatment

Methylcyclohexane : No data available

Results of PBT assessment

Methylcyclohexane : Non-classified PBT substance, Non-classified vPvB substance

Additional ecological information : Toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

The information in this MSDS pertains only to the product as shipped.

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

Product	:	The product should not be allowed to enter drains, water courses or the soil. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.
Contaminated packaging	:	Empty remaining contents. Dispose of as unused product. Do not re-use empty containers. Do not burn, or use a cutting torch on, the empty drum.

For additional details, see the Exposure Scenario in the Annex portion

SECTION 14: Transport information

The shipping descriptions shown here are for bulk shipments only, and may not apply to shipments in non-bulk packages (see regulatory definition).

Consult the appropriate domestic or international mode-specific and quantity-specific Dangerous Goods Regulations for additional shipping description requirements (e.g., technical name or names, etc.) Therefore, the information shown here, may not always agree with the bill of lading shipping description for the material. Flashpoints for the material may vary slightly between the MSDS and the bill of lading.

US DOT (UNITED STATES DEPARTMENT OF TRANSPORTATION)
UN2296, METHYLCYCLOHEXANE, 3, II

IMO / IMDG (INTERNATIONAL MARITIME DANGEROUS GOODS)
UN2296, METHYLCYCLOHEXANE, 3, II, (-5,5 °C), MARINE POLLUTANT, (METHYLCYCLOHEXANE)

IATA (INTERNATIONAL AIR TRANSPORT ASSOCIATION)
UN2296, METHYLCYCLOHEXANE, 3, II

ADR (AGREEMENT ON DANGEROUS GOODS BY ROAD (EUROPE))
UN2296, METHYLCYCLOHEXANE, 3, II, (D/E), ENVIRONMENTALLY HAZARDOUS, (METHYLCYCLOHEXANE)

RID (REGULATIONS CONCERNING THE INTERNATIONAL TRANSPORT OF DANGEROUS GOODS (EUROPE))
UN2296, METHYLCYCLOHEXANE, 3, II, ENVIRONMENTALLY HAZARDOUS, (METHYLCYCLOHEXANE)

ADN (EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY INLAND WATERWAYS)
UN2296, METHYLCYCLOHEXANE, 3, II, ENVIRONMENTALLY HAZARDOUS, (METHYLCYCLOHEXANE)

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Other information	**:**	**Methylcyclohexane, S.T. 2, Cat. Y**

SECTION 15: Regulatory information

National legislation

Chemical Safety Assessment

Ingredients : methylcyclohexane 203-624-3

Major Accident Hazard Legislation : 96/82/EC Update: 2003
Dangerous for the environment
9b
Quantity 1: 200 t
Quantity 2: 500 t

: 96/82/EC Update: 2003
Highly flammable
7b
Quantity 1: 5.000 t
Quantity 2: 50.000 t

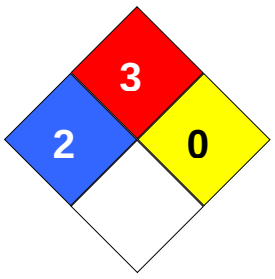
Water contaminating class (Germany) : WGK 2 water endangering

Notification status

Europe REACH	:	On the inventory, or in compliance with the inventory
United States of America TSCA	:	On the inventory, or in compliance with the inventory
Canada DSL	:	On the inventory, or in compliance with the inventory
Australia AICS	:	On the inventory, or in compliance with the inventory
New Zealand NZIoC	:	On the inventory, or in compliance with the inventory
Japan ENCS	:	On the inventory, or in compliance with the inventory
Korea KECI	:	On the inventory, or in compliance with the inventory
Philippines PICCS	:	On the inventory, or in compliance with the inventory
China IECSC	:	On the inventory, or in compliance with the inventory

SECTION 16: Other information

NFPA Classification : Health Hazard: 2
Fire Hazard: 3
Reactivity Hazard: 0



Further information

Legacy MSDS Number : 34310

Significant changes since the last version are highlighted in the margin. This version replaces all previous versions.

The information in this MSDS pertains only to the product as shipped.

The information provided in this Material Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AICS	Australia, Inventory of Chemical Substances	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50	Lethal Concentration 50%		

Full text of R-phrases referred to under sections 2 and 3

R11	Highly flammable.
R38	Irritating to skin.
R51	Toxic to aquatic organisms.
R51/53	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R53	May cause long-term adverse effects in the aquatic environment.
R65	Harmful: may cause lung damage if swallowed.
R67	Vapors may cause drowsiness and dizziness.

Full text of H-Statements referred to under sections 2 and 3.

H225	Highly flammable liquid and vapor.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H336	May cause drowsiness or dizziness.
H400	Very toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.

Annex

1. Short title of Exposure Scenario: **Solvent in other applications**

Main User Groups	:	**SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of use	:	**SU3:** Industrial Manufacturing (all)
Process category	:	**PROC1:** Use in closed process, no likelihood of exposure **PROC2:** Use in closed, continuous process with occasional controlled exposure **PROC3:** Use in closed batch process (synthesis or formulation) **PROC4:** Use in batch and other process (synthesis) where opportunity for exposure arises **PROC7:** Industrial spraying **PROC8a:** Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities **PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities **PROC10:** Roller application or brushing **PROC13:** Treatment of articles by dipping and pouring
Environmental release category	:	**ERC4:** Industrial use of processing aids in processes and products, not becoming part of articles

2.1 Contributing scenario controlling environmental exposure for:ERC4: Industrial use of processing aids in processes and products, not becoming part of articles

Concentration of the Substance in Mixture/Article	:	5-25%

Environment factors not influenced by risk management

Flow rate	:	90.000 m3/d

Other given operational conditions affecting environmental exposure

Emission or Release Factor: Air	:	0,3 %
Emission or Release Factor: Water	:	0,003 %
Emission or Release Factor: Soil	:	0,1 %
Local release rate: Air	:	0,66 kg/day
Local release rate: Water	:	0,0065 kg/day
Local release rate: Soil	:	40 kg/day

Technical conditions and measures / Organizational measures

Air	:	Treat air emission to provide a typical removal efficiency of (%): (Effectiveness: 70 %)
Water	:	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%): (Effectiveness: > 96,4 %)

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	Municipal sewage treatment plant, No

Flow rate of sewage treatment plant effluent	:	2.000 m3/d
Sludge Treatment	:	Agricultural soil, No

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Product characteristics

Concentration of the Substance in Mixture/Article	:	5-25%
Physical Form (at time of use)	:	Liquid substance

Frequency and duration of use

Exposure duration	:	> 4 h
Frequency of use	:	5 days/week

Human factors not influenced by risk management

Exposed skin area	:	One hand face only (240 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor

Technical conditions and measures

Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation

Personal Protection, None required
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics

Concentration of the Substance in Mixture/Article	:	5-25%
Physical Form (at time of use)	:	Liquid substance

Frequency and duration of use

Exposure duration	:	> 4 h
Frequency of use	:	5 days/week

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor

Technical conditions and measures

Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation

Protective gloves (Effectiveness: 90 %)

Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

Product characteristics

Concentration of the Substance in Mixture/Article	:	5-25%
Physical Form (at time of use)	:	Liquid substance

Frequency and duration of use

Exposure duration	:	> 4 h
Frequency of use	:	5 days/week

Human factors not influenced by risk management

Exposed skin area	:	One hand face only (240 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor

Technical conditions and measures

Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation

Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

Product characteristics

Concentration of the Substance in Mixture/Article	:	5-25%
Physical Form (at time of use)	:	Liquid substance

Frequency and duration of use

Exposure duration	:	> 4 h
Frequency of use	:	5 days/week

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor

Technical conditions and measures

Local exhaust ventilation- inhalation:, Yes (Effectiveness: 90 %)

Conditions and measures related to personal protection, hygiene and health evaluation

Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC7: Industrial spraying

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
: 1500 cm2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation-dermal:, Yes (Effectiveness: 95 %)

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Two hands (960 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 90 %)

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC8b: Transfer of

substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Two hands (960 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 95 %)

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC10: Roller application or brushing

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : 1 - 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Two hands (960 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 90 %)

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC13: Treatment of articles by dipping and pouring

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation- inhalation:, Yes (Effectiveness: 90 %)

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

3. Exposure estimation and reference to its source

Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterization ratio
ERC4	Petrorisk		Freshwater		0,00018 mg/L	
			Freshwater sediment		0,0043 mg/kg dry weight (d.w.)	
			Marine water		0,000018 mg/L	
			Marine sediment		0,00043 mg/kg dry weight (d.w.)	
			Sewage treatment plant		0,0018 mg/L	
			Agricultural soil		0,0000012 mg/kg	

ERC4: Industrial use of processing aids in processes and products, not becoming part of articles

Workers/Consumers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterization ratio
PROC1	EasyTRA		Worker – dermal, long-term – systemic	0,020571 mg/kg/d	
			Worker – inhalation, long-term – systemic	0,024547 mg/m3	
			Worker – long-term – systemic Combined routes	0,024078 mg/kg/d	
PROC2	EasyTRA		Worker – dermal, long-term – systemic	0,082286 mg/kg/d	

			Worker – inhalation, long-term – systemic	12,273 mg/m3	
			Worker – long-term – systemic Combined routes	1,836 mg/kg/d	
PROC3	EasyTRA		Worker – dermal, long-term – systemic	0,041143 mg/kg/d	
			Worker – inhalation, long-term – systemic	24,547 mg/m3	
			Worker – long-term – systemic Combined routes	3,548 mg/kg/d	
PROC4	EasyTRA		Worker – dermal, long-term – systemic	0,411429 mg/kg/d	
			Worker – inhalation, long-term – systemic	4,909 mg/m3	
			Worker – long-term – systemic Combined routes	1,113 mg/kg/d	
PROC7	EasyTRA		Worker – dermal, long-term – systemic	0,128571 mg/kg/d	
			Worker – inhalation, long-term – systemic	30,683 mg/m3	
			Worker – long-term – systemic Combined routes	4,512 mg/kg/d	
PROC8a	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	12,273 mg/m3	
			Worker – long-term – systemic Combined routes	2,576 mg/kg/d	
PROC8b	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	3,068 mg/m3	
			Worker – long-term – systemic Combined routes	1,261 mg/kg/d	
PROC10	EasyTRA		Worker – dermal, long-term – systemic	0,987429 mg/kg/d	
			Worker – inhalation, long-term – systemic	7,364 mg/m3	
			Worker – long-term – systemic Combined routes	2,039 mg/kg/d	
PROC13	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	12,273 mg/m3	
			Worker – long-term – systemic Combined routes	2,576 mg/kg/d	

PROC1: Use in closed process, no likelihood of exposure

PROC2: Use in closed, continuous process with occasional controlled exposure

PROC3: Use in closed batch process (synthesis or formulation)

PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

PROC7: Industrial spraying

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

PROC10: Roller application or brushing

PROC13: Treatment of articles by dipping and pouring

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Predicted releases are not expected to lead to environmental concentrations which would exceed the PNEC when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

1. Short title of Exposure Scenario: **Use in polymer processing – professional**

Main User Groups	:	**SU 22:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Sector of use	:	**SU 22, SU0:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen), Other
Process category	:	**PROC1:** Use in closed process, no likelihood of exposure **PROC2:** Use in closed, continuous process with occasional controlled exposure **PROC6:** Calendering operations **PROC8a:** Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities **PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities **PROC14:** Production of mixtures or articles by tabletting, compression, extrusion, pelletization; Industrial setting; **PROC21:** Low energy manipulation of substances bound in materials and/ or articles
Environmental release category	:	**ERC8a, ERC8d:** Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems
Further information	:	Processing of formulated polymers including material transfers, moulding and forming activities, material re-works and associated maintenance.

2.1 Contributing scenario controlling environmental exposure for:ERC8a, ERC8d: Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems

Concentration of the Substance in Mixture/Article	:	5-25%

Environment factors not influenced by risk management

Flow rate	:	90.000 m3/d

Other given operational conditions affecting environmental exposure

Emission or Release Factor: Air	:	98 %
Emission or Release Factor: Water	:	1 %
Emission or Release Factor: Soil	:	1 %
Local release rate: Water	:	1,6 kg/day
Local release rate: Air	:	160 kg/day
Local release rate: Soil	:	0,0033 kg/day

Technical conditions and measures / Organizational measures

Air	:	Treat air emission to provide a typical removal efficiency of (%): (Effectiveness: 0 %)
Water	:	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%): (Effectiveness: > 96,4 %)

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	Municipal sewage treatment plant, No
Flow rate of sewage treatment plant effluent	:	2.000 m3/d
Sludge Treatment	:	Agricultural soil, Yes, applicable

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Product characteristics

Concentration of the Substance in Mixture/Article	:	5-25%
Physical Form (at time of use)	:	Liquid substance

Frequency and duration of use

Exposure duration	:	> 4 h
Frequency of use	:	5 days/week

Human factors not influenced by risk management

Exposed skin area	:	One hand face only (240 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor

Technical conditions and measures

Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation

Personal Protection, None required
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics

Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC6: Calendering operations

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : 1 - 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Two hands (960 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

Product characteristics
Concentration of the Substance in : 5-25%

Mixture/Article

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Two hands (960 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, Yes, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Two hands (960 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, Yes, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC14: Production of mixtures or articles by tabletting, compression, extrusion, pelletization; Industrial setting;

Product characteristics
Concentration of the Substance in : 5-25%

Mixture/Article

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, Yes, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC21: Low energy manipulation of substances bound in materials and/ or articles

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Skin
: 1980 cm2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, Yes, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

3. Exposure estimation and reference to its source

Environment

Contributing Scenario	Exposure Assessment	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterization

	Method					ratio
ERC8a, ERC8d	Petrorisk		Freshwater		0,0000065 mg/L	
			Freshwater sediment		0,000035 mg/kg dry weight (d.w.)	
			Marine water		0,0000001 mg/L	
			Marine sediment		0,0000035 mg/kg dry weight (d.w.)	
			Sewage treatment plant		0,000015 mg/L	
			Agricultural soil		0,00001 mg/kg	

ERC8a: Wide dispersive indoor use of processing aids in open systems
ERC8d: Wide dispersive outdoor use of processing aids in open systems

Workers/Consumers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterization ratio
PROC1	EasyTRA		Worker – dermal, long-term – systemic	0,020571 mg/kg/d	
			Worker – inhalation, long-term – systemic	0,024547 mg/m3	
			Worker – long-term – systemic Combined routes	0,024078 mg/kg/d	
PROC2	EasyTRA		Worker – dermal, long-term – systemic	0,082286 mg/kg/d	
			Worker – inhalation, long-term – systemic	49,093 mg/m3	
			Worker – long-term – systemic Combined routes	7,096 mg/kg/d	
PROC6	EasyTRA		Worker – dermal, long-term – systemic	0,987429 mg/kg/d	
			Worker – inhalation, long-term – systemic	14,728 mg/m3	
			Worker – long-term – systemic Combined routes	3,091 mg/kg/d	
PROC8a	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	24,547 mg/m3	
			Worker – long-term – systemic Combined routes	4,33 mg/kg/d	
PROC8b	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	12,273 mg/m3	
			Worker – long-term – systemic Combined routes	2,576 mg/kg/d	
PROC14	EasyTRA		Worker – dermal, long-term – systemic	0,205714 mg/kg/d	
			Worker – inhalation, long-term – systemic	24,547 mg/m3	
			Worker – long-term – systemic Combined routes	3,712 mg/kg/d	
PROC21	EasyTRA		Worker – dermal, long-term – systemic	0,169714 mg/kg/d	
			Worker – inhalation, long-term – systemic		

			Worker – long-term – systemic Combined routes	0,169714 mg/kg/d	

PROC1: Use in closed process, no likelihood of exposure

PROC2: Use in closed, continuous process with occasional controlled exposure

PROC6: Calendering operations

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

PROC14: Production of mixtures or articles by tabletting, compression, extrusion, pelletization; Industrial setting;

PROC21: Low energy manipulation of substances bound in materials and/ or articles

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Predicted releases are not expected to lead to environmental concentrations which would exceed the PNEC when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

1. Short title of Exposure Scenario: **Use in coatings – professional**

Main User Groups	:	**SU 22:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Sector of use	:	**SU 22, SU0:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen), Other
Process category	:	**PROC1:** Use in closed process, no likelihood of exposure **PROC2:** Use in closed, continuous process with occasional controlled exposure **PROC3:** Use in closed batch process (synthesis or formulation) **PROC4:** Use in batch and other process (synthesis) where opportunity for exposure arises **PROC5:** Mixing or blending in batch processes for formulation of mixtures and articles (multistage and/or significant contact) Industrial setting; **PROC8a:** Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities **PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities **PROC10:** Roller application or brushing **PROC11:** Non industrial spraying

		PROC13: Treatment of articles by dipping and pouring **PROC15:** Use as laboratory reagent **PROC19:** Hand-mixing with intimate contact and only PPE available
Environmental release category	:	**ERC8a, ERC8d:** Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems
Further information	:	Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, brush, spreader by hand or similar methods, and film formation), and equipment cleaning, maintenance and associated laboratory activities.

2.1 Contributing scenario controlling environmental exposure for:ERC8a, ERC8d: Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems

Concentration of the Substance in Mixture/Article	:	5-25%

Environment factors not influenced by risk management

Flow rate	:	90.000 m3/d

Other given operational conditions affecting environmental exposure

Emission or Release Factor: Air	:	98 %
Emission or Release Factor: Water	:	1 %
Emission or Release Factor: Soil	:	1 %
Local release rate: Water	:	1,1 kg/day
Local release rate: Air	:	11 kg/day
Local release rate: Soil	:	0,000002 kg/day

Technical conditions and measures / Organizational measures

Air	:	Treat air emission to provide a typical removal efficiency of (%): (Effectiveness: 0 %)
Water	:	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%): (Effectiveness: > 96,4 %)

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	Municipal sewage treatment plant, No
Flow rate of sewage treatment plant effluent	:	2.000 m3/d
Sludge Treatment	:	Agricultural soil, Yes, applicable

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Product characteristics

Concentration of the Substance in Mixture/Article	:	5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : One hand face only (240 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Personal Protection, None required
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : One hand face only (240 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC4, PROC5, PROC13: Use in batch and other process (synthesis) where opportunity for exposure arises, Mixing or blending in batch processes for formulation of mixtures and articles (multistage and/or significant contact) Industrial setting;, Treatment of articles by dipping and pouring

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a, PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities, Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Two hands (960 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC10: Roller application or brushing

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : 1 - 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Two hands (960 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC11: Non industrial spraying

Product characteristics
Concentration of the Substance in Mixture/Article : 1-5%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : 1 - 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Skin
: 1500 cm2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 95 %)

2.2 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : One hand face only (240 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC19: Hand-mixing with intimate contact and only PPE available

Product characteristics
Concentration of the Substance in Mixture/Article : 1-5%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : 15 - 60 min
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Skin
: 1980 cm2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

3. Exposure estimation and reference to its source

Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterization ratio
ERC8a, ERC8d	Petrorisk		Freshwater		0,000006 mg/L	
			Freshwater sediment		0,000055 mg/kg dry weight (d.w.)	
			Marine water		0,000099 µg/L	
			Marine sediment		0,0000024 mg/kg dry weight (d.w.)	
			Sewage treatment plant		0,0000099 mg/L	
			Agricultural soil		0,0000069 mg/kg	

ERC8a: Wide dispersive indoor use of processing aids in open systems
ERC8d: Wide dispersive outdoor use of processing aids in open systems

Workers/Consumers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterization ratio
PROC1	EasyTRA		Worker – dermal, long-term – systemic	0,020571 mg/kg/d	
			Worker – inhalation, long-term – systemic	0,024547 mg/m3	
			Worker – long-term – systemic Combined routes	0,024078 mg/kg/d	
PROC2	EasyTRA		Worker – dermal, long-term – systemic	0,082286 mg/kg/d	
			Worker – inhalation, long-term – systemic	49,093 mg/m3	
			Worker – long-term – systemic Combined routes	7,096 mg/kg/d	
PROC3	EasyTRA		Worker – dermal, long-	0,041143 mg/kg/d	

			term – systemic		
			Worker – inhalation, long-term – systemic	61,366 mg/m3	
			Worker – long-term – systemic Combined routes	8,808 mg/kg/d	
PROC4	EasyTRA		Worker – dermal, long-term – systemic	0,411429 mg/kg/d	
			Worker – inhalation, long-term – systemic	12,273 mg/m3	
			Worker – long-term – systemic Combined routes	2,165 mg/kg/d	
PROC5	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	14,728 mg/m3	
			Worker – long-term – systemic Combined routes	2,598 mg/kg	
PROC13	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	24,547 mg/m3	
			Worker – long-term – systemic Combined routes	4,33 mg/kg	
PROC8a	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	24,547 mg/m3	
			Worker – long-term – systemic Combined routes	4,33 mg/kg/d	
PROC8b	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	12,273 mg/m3	
			Worker – long-term – systemic Combined routes	2,576 mg/kg/d	
PROC10	EasyTRA		Worker – dermal, long-term – systemic	0,987429 mg/kg/d	
			Worker – inhalation, long-term – systemic	14,728 mg/m3	
			Worker – long-term – systemic Combined routes	3,091 mg/kg/d	
PROC11	EasyTRA		Worker – dermal, long-term – systemic	1,286 mg/kg/d	
			Worker – inhalation, long-term – systemic	12,273 mg/m3	
			Worker – long-term – systemic Combined routes	3,039 mg/kg/d	
PROC15	EasyTRA		Worker – dermal, long-term – systemic	0,020571 mg/kg/d	
			Worker – inhalation, long-term – systemic	2,455 mg/m3	
			Worker – long-term – systemic Combined routes	0,371236 mg/kg/d	
PROC19	EasyTRA		Worker – dermal, long-term – systemic	0,565714 mg/kg/d	
			Worker – inhalation, long-term – systemic	1,636 mg/m3	
			Worker – long-term – systemic Combined routes	0,799491 mg/kg/d	

PROC1: Use in closed process, no likelihood of exposure

PROC2: Use in closed, continuous process with occasional controlled exposure

PROC3: Use in closed batch process (synthesis or formulation)

PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

PROC5: Mixing or blending in batch processes for formulation of mixtures and articles (multistage and/or significant contact) Industrial setting;

PROC13: Treatment of articles by dipping and pouring

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

PROC10: Roller application or brushing

PROC11: Non industrial spraying

PROC15: Use as laboratory reagent

PROC19: Hand-mixing with intimate contact and only PPE available

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Predicted releases are not expected to lead to environmental concentrations which would exceed the PNEC when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

1. Short title of Exposure Scenario: **Lubricants - Professional**

Main User Groups	:	**SU 22:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Sector of use	:	**SU 22, SU0:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen), Other
Process category	:	**PROC1:** Use in closed process, no likelihood of exposure **PROC2:** Use in closed, continuous process with occasional controlled exposure **PROC3:** Use in closed batch process (synthesis or formulation) **PROC4:** Use in batch and other process (synthesis) where opportunity for exposure arises **PROC8a:** Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities **PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities **PROC9:** Transfer of substance or preparation into small

containers (dedicated filling line, including weighing)
PROC10: Roller application or brushing
PROC11: Non industrial spraying
PROC13: Treatment of articles by dipping and pouring
PROC17: Lubrication at high energy conditions and in partly open process
PROC18: Greasing at high energy conditions
PROC20: Heat and pressure transfer fluids in dispersive, professional use but closed systems

Environmental release category	:	**ERC8a, ERC8d, ERC9a, ERC9b:** Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems, Wide dispersive indoor use of substances in closed systems, Wide dispersive outdoor use of substances in closed systems
Further information	:	Covers the use of formulated lubricants in closed and open systems including transfer operations, operation of engines and similar articles, reworking on reject articles, equipment maintenance and disposal of waste oil.

2.1 Contributing scenario controlling environmental exposure for:ERC8a, ERC8d, ERC9a, ERC9b: Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems, Wide dispersive indoor use of substances in closed systems, Wide dispersive outdoor use of substances in closed systems

Concentration of the Substance in Mixture/Article	:	5-25%

Environment factors not influenced by risk management

Flow rate	:	90.000 m3/d

Other given operational conditions affecting environmental exposure

Emission or Release Factor: Air	:	40 %
Emission or Release Factor: Water	:	5 %
Emission or Release Factor: Soil	:	5 %
Local release rate: Water	:	5,6 kg/day
Local release rate: Air	:	44 kg/day
Local release rate: Soil	:	0,011 kg/day

Technical conditions and measures / Organizational measures

Air	:	Treat air emission to provide a typical removal efficiency of (%): (Effectiveness: 0 %)
Water	:	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%): (Effectiveness: > 96,4 %)

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	Municipal sewage treatment plant, No
Flow rate of sewage treatment plant effluent	:	2.000 m3/d
Sludge Treatment	:	Agricultural soil, Yes, applicable

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed

process, no likelihood of exposure

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : One hand face only (240 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
None required
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : One hand face only (240 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC4, PROC9, PROC13, PROC20: Use in batch and other process (synthesis) where opportunity for exposure arises, Transfer of substance or preparation into small containers (dedicated filling line, including weighing), Treatment of articles by dipping and pouring, Heat and pressure transfer fluids in dispersive, professional use but closed systems

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a, PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at

non-dedicated facilities, Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Two hands (960 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC10, PROC18: Roller application or brushing, Greasing at high energy conditions

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : 1 - 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Two hands (960 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC11: Non industrial spraying

Product characteristics
Concentration of the Substance in Mixture/Article : 1 - 5%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : 1 - 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Skin
: 1500 cm2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 95 %)

2.2 Contributing scenario controlling worker exposure for: PROC17: Lubrication at high energy conditions and in partly open process

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : 1 - 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Two hands (960 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 95 %)

3. Exposure estimation and reference to its source

Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterization ratio
ERC8a, ERC8d, ERC9a, ERC9b	Petrorisk		Freshwater		0,0000049 mg/L	
			Freshwater sediment		0,00012 mg/kg dry weight (d.w.)	
			Marine water		0,00049 µg/L	
			Marine sediment		0,000012 mg/kg dry weight (d.w.)	
			Sewage treatment plant		0,000049 mg/L	
			Agricultural soil		0,000035 mg/kg	

ERC8a: Wide dispersive indoor use of processing aids in open systems
ERC8d: Wide dispersive outdoor use of processing aids in open systems
ERC9a: Wide dispersive indoor use of substances in closed systems
ERC9b: Wide dispersive outdoor use of substances in closed systems

Workers/Consumers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterization ratio
PROC1	EasyTRA		Worker – dermal, long-term – systemic	0,020571 mg/kg/d	
			Worker – inhalation, long-term – systemic	0,024547 mg/m3	
			Worker – long-term – systemic Combined routes	0,024078 mg/kg/d	
PROC2	EasyTRA		Worker – dermal, long-term – systemic	0,082286 mg/kg/d	
			Worker – inhalation, long-term – systemic	49,093 mg/m3	
			Worker – long-term – systemic Combined routes	7,096 mg/kg/d	
PROC3	EasyTRA		Worker – dermal, long-term – systemic	0,041143 mg/kg/d	
			Worker – inhalation, long-term – systemic	61,366 mg/m3	
			Worker – long-term – systemic Combined routes	8,808 mg/kg/d	
PROC4	EasyTRA		Worker – dermal, long-term – systemic	0,411429 mg/kg/d	
			Worker – inhalation, long-term – systemic	12,273 mg/m3	
			Worker – long-term – systemic Combined routes	2,165 mg/kg/d	
PROC9	EasyTRA		Worker – dermal, long-term – systemic	0,411429 mg/kg/d	
			Worker – inhalation, long-term – systemic	24,547 mg/m3	
			Worker – long-term – systemic Combined routes	3,918 mg/kg/d	
PROC13	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	24,547 mg/m3	
			Worker – long-term – systemic Combined routes	4,33 mg/kg/d	
PROC20	EasyTRA		Worker – dermal, long-	0,102857 mg/kg/d	

			term – systemic		
			Worker – inhalation, long-term – systemic	4,909 mg/m3	
			Worker – long-term – systemic Combined routes	0,804186 mg/kg/d	
PROC8a	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	24,547 mg/m3	
			Worker – long-term – systemic Combined routes	4,33 mg/kg/d	
PROC8b	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	12,273 mg/m3	
			Worker – long-term – systemic Combined routes	2,576 mg/kg/d	
PROC10	EasyTRA		Worker – dermal, long-term – systemic	0,987429 mg/kg/d	
			Worker – inhalation, long-term – systemic	14,728 mg/m3	
			Worker – long-term – systemic Combined routes	3,091 mg/kg/d	
PROC18	EasyTRA		Worker – dermal, long-term – systemic	0,493714 mg/kg/d	
			Worker – inhalation, long-term – systemic	29,456 mg/m3	
			Worker – long-term – systemic Combined routes	4,702 mg/kg/d	
PROC11	EasyTRA		Worker – dermal, long-term – systemic	1,286 mg/kg/d	
			Worker – inhalation, long-term – systemic	12,273 mg/m3	
			Worker – long-term – systemic Combined routes	3,039 mg/kg/d	
PROC17	EasyTRA		Worker – dermal, long-term – systemic	0,987429 mg/kg/d	
			Worker – inhalation, long-term – systemic	14,728 mg/m3	
			Worker – long-term – systemic Combined routes	3,091 mg/kg/d	

PROC1: Use in closed process, no likelihood of exposure

PROC2: Use in closed, continuous process with occasional controlled exposure

PROC3: Use in closed batch process (synthesis or formulation)

PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

PROC13: Treatment of articles by dipping and pouring

PROC20: Heat and pressure transfer fluids in dispersive, professional use but closed systems

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

PROC10: Roller application or brushing

PROC18: Greasing at high energy conditions

PROC11: Non industrial spraying

PROC17: Lubrication at high energy conditions and in partly open process

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Predicted releases are not expected to lead to environmental concentrations which would exceed the PNEC when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

1. Short title of Exposure Scenario: **Use as a cleaning agent – professional**

Main User Groups	:	**SU 22:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Sector of use	:	**SU 22, SU0:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen), Other
Process category	:	**PROC1:** Use in closed process, no likelihood of exposure **PROC2:** Use in closed, continuous process with occasional controlled exposure **PROC3:** Use in closed batch process (synthesis or formulation) **PROC4:** Use in batch and other process (synthesis) where opportunity for exposure arises **PROC8a:** Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities **PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities **PROC10:** Roller application or brushing **PROC11:** Non industrial spraying **PROC13:** Treatment of articles by dipping and pouring
Environmental release category	:	**ERC8a, ERC8d:** Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems
Further information	:	Covers the use as a component of cleaning products including pouring/unloading from drums or containers; and exposures during mixing/diluting in the preparatory phase and cleaning activities (including spraying, brushing, dipping, wiping automated and by hand).

2.1 Contributing scenario controlling environmental exposure for:ERC8a, ERC8d: Wide

dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems

Concentration of the Substance in Mixture/Article	:	5-25%

Environment factors not influenced by risk management

Flow rate	:	90.000 m3/d

Other given operational conditions affecting environmental exposure

Emission or Release Factor: Air	:	2 %
Emission or Release Factor: Water	:	0,0001 %
Emission or Release Factor: Soil	:	0 %
Local release rate: Water	:	1,1 kg/day
Local release rate: Air	:	22 kg/day
Local release rate: Soil	:	
Remarks	:	There is no direct exposure to soil.

Technical conditions and measures / Organizational measures

Air	:	Treat air emission to provide a typical removal efficiency of (%): (Effectiveness: 0 %)
Water	:	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%): (Effectiveness: > 96,4 %)

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	Municipal sewage treatment plant, No
Flow rate of sewage treatment plant effluent	:	2.000 m3/d
Sludge Treatment	:	Agricultural soil, Yes, applicable

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Product characteristics

Concentration of the Substance in Mixture/Article	:	5-25%
Physical Form (at time of use)	:	Liquid substance

Frequency and duration of use

Exposure duration	:	> 4 h
Frequency of use	:	5 days/week

Human factors not influenced by risk management

Exposed skin area	:	One hand face only (240 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor

Technical conditions and measures

Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation

None required
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics

Concentration of the Substance in Mixture/Article	:	5-25%
Physical Form (at time of use)	:	Liquid substance

Frequency and duration of use

Exposure duration	:	> 4 h
Frequency of use	:	5 days/week

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

Product characteristics

Concentration of the Substance in Mixture/Article	:	5-25%
Physical Form (at time of use)	:	Liquid substance

Frequency and duration of use

Exposure duration	:	> 4 h
Frequency of use	:	5 days/week

Human factors not influenced by risk management

Exposed skin area	:	One hand face only (240 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC4, PROC13: Use in batch and other process (synthesis) where opportunity for exposure arises, Treatment of articles by dipping and pouring

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a, PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities, Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Two hands (960 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)

Respiratory Protection, Yes (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC10: Roller application or brushing

Product characteristics

Concentration of the Substance in Mixture/Article	:	5-25%
Physical Form (at time of use)	:	Liquid substance

Frequency and duration of use

Exposure duration	:	1 - 4 h
Frequency of use	:	5 days/week

Human factors not influenced by risk management

Exposed skin area	:	Two hands (960 cm2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor

Technical conditions and measures

Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation

Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC11: Non industrial spraying

Product characteristics

Concentration of the Substance in Mixture/Article	:	1-5%
Physical Form (at time of use)	:	Liquid substance

Frequency and duration of use

Exposure duration	:	1 - 4 h
Frequency of use	:	5 days/week

Human factors not influenced by risk management

Exposed skin area	:	Skin
	:	1500 cm2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor

Technical conditions and measures

Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation

Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 95 %)

3. Exposure estimation and reference to its source

Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterization ratio
ERC8a, ERC8d	Petrorisk		Freshwater		0,000005 mg/L	
			Freshwater sediment		0,000032 mg/kg dry weight (d.w.)	
			Marine water		0,000014 µg/L	
			Marine sediment		0,000056 µg/kg dry weight (d.w.)	
			Sewage treatment plant		0,00099 ng/L	
			Agricultural soil		0,00046 mg/kg	

ERC8a: Wide dispersive indoor use of processing aids in open systems
ERC8d: Wide dispersive outdoor use of processing aids in open systems

Workers/Consumers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterization ratio
PROC1	EasyTRA		Worker – dermal, long-term – systemic	0,020571 mg/kg/d	
			Worker – inhalation, long-term – systemic	0,024547 mg/m3	
			Worker – long-term – systemic Combined routes	0,024078 mg/kg/d	
PROC2	EasyTRA		Worker – dermal, long-term – systemic	0,082286 mg/kg/d	
			Worker – inhalation, long-term – systemic	49,093 mg/m3	
			Worker – long-term – systemic Combined routes	7,096 mg/kg/d	
PROC3	EasyTRA		Worker – dermal, long-term – systemic	0,041143 mg/kg/d	
			Worker – inhalation, long-term – systemic	61,366 mg/m3	
			Worker – long-term – systemic Combined routes	8,808 mg/kg/d	
PROC4	EasyTRA		Worker – dermal, long-term – systemic	0,411429 mg/kg/d	
			Worker – inhalation, long-term – systemic	12,273 mg/m3	
			Worker – long-term – systemic Combined routes	2,165 mg/kg/d	
PROC13	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	24,547 mg/m3	
			Worker – long-term – systemic Combined routes	4,33 mg/kg/d	
PROC8a	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	

			Worker – inhalation, long-term – systemic	24,547 mg/m3	
			Worker – long-term – systemic Combined routes	4,33 mg/kg/d	
PROC8b	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	12,273 mg/m3	
			Worker – long-term – systemic Combined routes	2,576 mg/kg/d	
PROC10	EasyTRA		Worker – dermal, long-term – systemic	0,987429 mg/kg/d	
			Worker – inhalation, long-term – systemic	14,728 mg/m3	
			Worker – long-term – systemic Combined routes	3,091 mg/kg/d	
PROC11	EasyTRA		Worker – dermal, long-term – systemic	1,286 mg/kg/d	
			Worker – inhalation, long-term – systemic	12,273 mg/m3	
			Worker – long-term – systemic Combined routes	3,039 mg/kg/d	

PROC1: Use in closed process, no likelihood of exposure

PROC2: Use in closed, continuous process with occasional controlled exposure

PROC3: Use in closed batch process (synthesis or formulation)

PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

PROC13: Treatment of articles by dipping and pouring

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

PROC10: Roller application or brushing

PROC11: Non industrial spraying

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Predicted releases are not expected to lead to environmental concentrations which would exceed the PNEC when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

1. Short title of Exposure Scenario: **Solvent in other applications- Professional**

Main User Groups : **SU 22:** Professional uses: Public domain (administration,

		education, entertainment, services, craftsmen)
Sector of use	:	**SU 22, SU0:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen), Other
Process category	:	**PROC1:** Use in closed process, no likelihood of exposure **PROC2:** Use in closed, continuous process with occasional controlled exposure **PROC3:** Use in closed batch process (synthesis or formulation) **PROC4:** Use in batch and other process (synthesis) where opportunity for exposure arises **PROC8a:** Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities **PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities **PROC10:** Roller application or brushing **PROC11:** Non industrial spraying **PROC13:** Treatment of articles by dipping and pouring
Environmental release category	:	**ERC8a, ERC8d:** Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems

2.1 Contributing scenario controlling environmental exposure for:ERC8a, ERC8d: Wide dispersive indoor use of processing aids in open systems, Wide dispersive outdoor use of processing aids in open systems

Concentration of the Substance in Mixture/Article	:	5-25%

Environment factors not influenced by risk management

Flow rate	:	90.000 m3/d

Other given operational conditions affecting environmental exposure

Emission or Release Factor: Air	:	40 %
Emission or Release Factor: Water	:	5 %
Emission or Release Factor: Soil	:	0 %
Local release rate: Water	:	8,4 kg/day
Local release rate: Air	:	66 kg/day
Local release rate: Soil	:	
Remarks	:	There is no direct exposure to soil.

Technical conditions and measures / Organizational measures

Air	:	Treat air emission to provide a typical removal efficiency of (%): (Effectiveness: 0 %)
Water	:	Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%): (Effectiveness: > 96,4 %)

Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	:	Municipal sewage treatment plant, No
Flow rate of sewage treatment plant effluent	:	2.000 m3/d

Sludge Treatment : Agricultural soil, Yes, applicable

2.2 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : One hand face only (240 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
None required
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : One hand face only (240 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a, PROC8b: Transfer

of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities, Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Two hands (960 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, None required

2.2 Contributing scenario controlling worker exposure for: PROC10: Roller application or brushing

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : 1 - 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Two hands (960 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC11: Non industrial

spraying

Product characteristics
Concentration of the Substance in Mixture/Article : 1-5%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : 1 - 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Skin
: 1500 cm2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 95 %)

2.2 Contributing scenario controlling worker exposure for: PROC13: Treatment of articles by dipping and pouring

Product characteristics
Concentration of the Substance in Mixture/Article : 5-25%

Physical Form (at time of use) : Liquid substance

Frequency and duration of use
Exposure duration : > 4 h
Frequency of use : 5 days/week

Human factors not influenced by risk management
Exposed skin area : Palms of both hands (480 cm2)

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor

Technical conditions and measures
Local exhaust ventilation, No

Conditions and measures related to personal protection, hygiene and health evaluation
Protective gloves, APF 10 (Effectiveness: 90 %)
Respiratory Protection, Yes (Effectiveness: 90 %)

3. Exposure estimation and reference to its source

Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterization ratio
ERC8a, ERC8d	Petrorisk		Freshwater		0,0000074 mg/L	
			Freshwater sediment		0,00018 mg/kg dry weight (d.w.)	
			Marine water		0,00074 µg/L	
			Marine sediment		0,000018 mg/kg dry weight (d.w.)	
			Sewage treatment plant		0,000074 mg/L	
			Agricultural soil		0,000052 mg/kg	

ERC8a: Wide dispersive indoor use of processing aids in open systems
ERC8d: Wide dispersive outdoor use of processing aids in open systems

Workers/Consumers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterization ratio
PROC1	EasyTRA		Worker – dermal, long-term – systemic	0,020571 mg/kg/d	
			Worker – inhalation, long-term – systemic	0,024547 mg/m3	
			Worker – long-term – systemic Combined routes	0,024078 mg/kg/d	
PROC2	EasyTRA		Worker – dermal, long-term – systemic	0,082286 mg/kg/d	
			Worker – inhalation, long-term – systemic	49,093 mg/m3	
			Worker – long-term – systemic Combined routes	7,096 mg/kg/d	
PROC3	EasyTRA		Worker – dermal, long-term – systemic	0,041143 mg/kg/d	
			Worker – inhalation, long-term – systemic	61,366 mg/m3	
			Worker – long-term – systemic Combined routes	8,808 mg/kg/d	
PROC4	EasyTRA		Worker – dermal, long-term – systemic	0,411429 mg/kg/d	
			Worker – inhalation, long-term – systemic	12,273 mg/m3	
			Worker – long-term – systemic Combined routes	2,165 mg/kg/d	
PROC8a	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	24,547 mg/m3	
			Worker – long-term – systemic Combined routes	4,33 mg/kg/d	
PROC8b	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	12,273 mg/m3	
			Worker – long-term – systemic Combined routes	2,576 mg/kg/d	
PROC10	EasyTRA		Worker – dermal, long-	0,987429 mg/kg/d	

			term – systemic		
			Worker – inhalation, long-term – systemic	14,728 mg/m3	
			Worker – long-term – systemic Combined routes	3,091 mg/kg/d	
PROC11	EasyTRA		Worker – dermal, long-term – systemic	1,286 mg/kg/d	
			Worker – inhalation, long-term – systemic	12,273 mg/m3	
			Worker – long-term – systemic Combined routes	3,039 mg/kg/d	
PROC13	EasyTRA		Worker – dermal, long-term – systemic	0,822857 mg/kg/d	
			Worker – inhalation, long-term – systemic	24,547 mg/m3	
			Worker – long-term – systemic Combined routes	4,33 mg/kg/d	

PROC1: Use in closed process, no likelihood of exposure

PROC2: Use in closed, continuous process with occasional controlled exposure

PROC3: Use in closed batch process (synthesis or formulation)

PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities

PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

PROC10: Roller application or brushing

PROC11: Non industrial spraying

PROC13: Treatment of articles by dipping and pouring

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Predicted releases are not expected to lead to environmental concentrations which would exceed the PNEC when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Fisher Scientific

Part of Thermo Fisher Scientific

SAFETY DATA SHEET

Creation Date 27-Jan-2010 **Revision Date** 02-Oct-2015 **Revision Number** 2

1. Identification

Product Name **Methylene chloride**

Cat No. : **D37-1; D37-4; D37-20; D37-200; D37-200LC; D37-500; D37FB-19; D37FB-50; D37FB-115; D37FB-200; D37POP-19; D37POPB-50; D37POPB-200; D37RB-19; D37RB-50; D37RB-115; D37RB-200; D37RS-19; D37RS-28; D37RS-50; D37RS-115; D37RS-200; D37SK-4; D37SK-4LC; D37SS-28; D37SS-50; D37SS-115; D37SS-200; D37SS-1350**

Synonyms Dichloromethane; DCM

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Carcinogenicity	Category 1B
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS), Respiratory system.	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Liver, Kidney, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes skin irritation
Causes serious eye irritation

May cause respiratory irritation
May cause drowsiness or dizziness
May cause cancer
May cause damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Wear eye/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)

WARNING! This product contains a chemical known in the State of California to cause cancer, birth defects or other reproductive harm.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Methylene chloride	75-09-2	>99.5
Methyl alcohol	67-56-1	0 - 0.4
Cyclohexene	110-83-8	0 - 0.01
2-Methyl-2-butene	513-35-9	0 - 0.01

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately.

Most important symptoms/effects Breathing difficulties. . Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature 556 °C / 1032.8 °F

Explosion Limits
Upper 23 vol %
Lower 13 vol %
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Carbon monoxide (CO) Carbon dioxide (CO_2) Hydrogen chloride gas Phosgene
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	1	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing. Keep people away from and upwind of spill/leak.

Environmental Precautions Should not be released into the environment. See Section 12 for additional ecological information.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Use only under a chemical fume hood.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Methylene chloride	TWA: 50 ppm	(Vacated) TWA: 500 ppm (Vacated) STEL: 2000 ppm (Vacated) Ceiling: 1000 ppm TWA: 25 ppm STEL: 125 ppm	IDLH: 2300 ppm
Methyl alcohol	TWA: 200 ppm STEL: 250 ppm Skin	(Vacated) TWA: 200 ppm (Vacated) TWA: 260 mg/m³ (Vacated) STEL: 250 ppm (Vacated) STEL: 325 mg/m³ Skin TWA: 200 ppm TWA: 260 mg/m³	IDLH: 6000 ppm TWA: 200 ppm TWA: 260 mg/m³ STEL: 250 ppm STEL: 325 mg/m³
Cyclohexene	TWA: 300 ppm	(Vacated) TWA: 300 ppm (Vacated) TWA: 1015 mg/m³ TWA: 300 ppm TWA: 1015 mg/m³	IDLH: 2000 ppm TWA: 300 ppm TWA: 1015 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Methylene chloride	TWA: 50 ppm TWA: 174 mg/m³	TWA: 100 ppm TWA: 330 mg/m³ STEL: 500 ppm STEL: 1740 mg/m³	TWA: 50 ppm
Methyl alcohol	TWA: 200 ppm TWA: 262 mg/m³ STEL: 250 ppm STEL: 328 mg/m³ Skin	TWA: 200 ppm TWA: 260 mg/m³ STEL: 250 ppm STEL: 310 mg/m³	TWA: 200 ppm STEL: 250 ppm Skin
Cyclohexene	TWA: 300 ppm TWA: 1010 mg/m³	TWA: 300 ppm TWA: 1015 mg/m³	TWA: 300 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	sweet
Odor Threshold	No information available
pH	Not applicable
Melting Point/Range	-97 °C / -142.6 °F
Boiling Point/Range	39 °C / 102.2 °F
Flash Point	No information available

Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	23 vol %
Lower	13 vol %
Vapor Pressure	20 mmHg @ 3502°C
Vapor Density	2.93 (Air = 1.0)
Specific Gravity	1.33
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	556 °C / 1032.8 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C H2 Cl2
Molecular Weight	84.93

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat.

Incompatible Materials Strong oxidizing agents, Strong acids, Amines

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2), Hydrogen chloride gas, Phosgene

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Methylene chloride	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rat)	53 mg/L (Rat) 6 h 76000 mg/m³ (Rat) 4 h
Methyl alcohol	LD50 = 6200 mg/kg (Rat)	LD50 = 15800 mg/kg (Rabbit)	64000 ppm (Rat) 4 h 83.2 mg/L (Rat) 4 h
Cyclohexene	LD50 = 2400 µL/kg (Rat)	>200 mg/kg (Rat)	>21.6 mg/L/4h (rat)
2-Methyl-2-butene	700-2600 mg/kg (Rat)	>2000 mg/kg (Rat)	LC50 > 61000 ppm (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Methylene chloride	75-09-2	Group 2A	Reasonably Anticipated	A3	X	A3
Methyl alcohol	67-56-1	Not listed	Not listed	Not listed	Not listed	Not listed

Cyclohexene	110-83-8	Not listed	Not listed	Not listed	Not listed	Not listed
2-Methyl-2-butene	513-35-9	Not listed	Not listed	Not listed	Not listed	Not listed

IARC: (International Agency for Research on Cancer)

IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

Mexico - Occupational Exposure Limits - Carcinogens
A1 - Confirmed Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Confirmed Animal Carcinogen
A4 - Not Classifiable as a Human Carcinogen
A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects Mutagenic effects have occured in microorganisms.

Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects Developmental effects have occurred in experimental animals.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS) Respiratory system
STOT - repeated exposure Liver Kidney Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting
Endocrine Disruptor Information No information available

Other Adverse Effects Tumorigenic effects have been reported in experimental animals. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

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Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Methylene chloride	EC50:>660 mg/L/96h	Pimephales promelas: LC50:193 mg/L/96h	EC50: 1 mg/L/24 h EC50: 2.88 mg/L/15 min	EC50: 140 mg/L/48h
Methyl alcohol	Not listed	Pimephales promelas: LC50 > 10000 mg/L 96h	EC50 = 39000 mg/L 25 min EC50 = 40000 mg/L 15 min EC50 = 43000 mg/L 5 min	EC50 > 10000 mg/L 24h
Cyclohexene	Not listed	Poecillia reticulata: 7.1 mg/L/96h	Not listed	Daphnia: EC50: 5.3 mg/L/48h
2-Methyl-2-butene	Not listed	Not listed	Not listed	EC50: = 3 mg/L, 48h (Daphnia magna)

Persistence and Degradability Persistence is unlikely based on information available.
Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility.

Component	log Pow
Methylene chloride	1.25
Methyl alcohol	-0.74

Cyclohexene	3.27

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Methylene chloride - 75-09-2	U080	-
Methyl alcohol - 67-56-1	U154	-

14. Transport information

DOT

UN-No UN1593
Proper Shipping Name DICHLOROMETHANE
Hazard Class 6.1
Packing Group III

TDG

UN-No UN1593
Proper Shipping Name DICHLOROMETHANE
Hazard Class 6.1
Packing Group III

IATA

UN-No UN1593
Proper Shipping Name Dichloromethane
Hazard Class 6.1
Packing Group III

IMDG/IMO

UN-No UN1593
Proper Shipping Name Dichloromethane
Hazard Class 6.1
Packing Group III

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Methylene chloride	X	X	-	200-838-9	-		X	X	X	X	X
Methyl alcohol	X	X	-	200-659-6	-		X	X	X	X	X
Cyclohexene	X	X	-	203-807-8	-		X	X	X	X	X
2-Methyl-2-butene	X	X	-	208-156-3	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b)

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Methylene chloride	75-09-2	>99.5	0.1
Methyl alcohol	67-56-1	0 - 0.4	1.0

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Methylene chloride	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Methylene chloride	X		-
Methyl alcohol	X		-

OSHA Occupational Safety and Health Administration

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Methylene chloride	125 ppm STEL 12.5 ppm Action Level 25 ppm TWA	-

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Methylene chloride	1000 lb 1 lb	-
Methyl alcohol	5000 lb	-

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Methylene chloride	75-09-2	Carcinogen	200 µg/day 50 µg/day	Carcinogen
Methyl alcohol	67-56-1	Developmental	-	Developmental

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Methylene chloride	X	X	X	X	X
Methyl alcohol	X	X	X	X	X
Cyclohexene	X	X	X	-	X
2-Methyl-2-butene	X	X	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ):	Y
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class D1B Toxic materials
D2A Very toxic materials



16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 27-Jan-2010
Revision Date 02-Oct-2015
Print Date 02-Oct-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

SAFETY DATA SHEET

Version 6.15
Revision Date 09/07/2024
Print Date 09/08/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : *tert*-Butyl methyl ether

Product Number : 306975
Brand : Sigma-Aldrich
Index-No. : 603-181-00-X
CAS-No. : 1634-04-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Skin irritation (Category 2), H315

For the full text of the H-Statements mentioned in this Section, see Section 16.

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operates as MilliporeSigma in the US and Canada

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Danger

Hazard Statements

H225	Highly flammable liquid and vapor.
H315	Causes skin irritation.

Precautionary Statements

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P264	Wash skin thoroughly after handling.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	MTBE Methyl tert-butyl ether
Formula	:	$C_5H_{12}O$
Molecular weight	:	88.15 g/mol
CAS-No.	:	1634-04-4
EC-No.	:	216-653-1
Index-No.	:	603-181-00-X

Component	Classification	Concentration
tert-butyl methyl ether		
	Flam. Liq. 2; Skin Irrit. 2; H225, H315	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

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SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2) Foam Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
Development of hazardous combustion gases or vapours possible in the event of fire.
Forms explosive mixtures with air at ambient temperatures.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

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SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material (e.g. Chemizorb®).
Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

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Component	CAS-No.	Value	Control parameters	Basis
tert-butyl methyl ether	1634-04-4	TWA	50 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Confirmed animal carcinogen with unknown relevance to humans		
		PEL	40 ppm 144 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 120 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter type AX
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

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SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Color: colorless
b)	Odor	characteristic
c)	Odor Threshold	0.053 ppm
d)	pH	No data available
e)	Melting point/freezing point	Melting point: -108.6 °C (-163.5 °F) at 1,013 hPa
f)	Initial boiling point and boiling range	55 - 56 °C 131 - 133 °F - lit.
g)	Flash point	-28 °C (-18 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 8.5 %(V) Lower explosion limit: 1.6 %(V)
k)	Vapor pressure	330 hPa at 25 °C (77 °F) - OECD Test Guideline 104
l)	Vapor density	No data available
m)	Density	0.74 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	0.7420 °C
n)	Water solubility	42 g/l at 20 °C (68 °F) - OECD Test Guideline 105
o)	Partition coefficient: n-octanol/water	log Pow: 1.06 at 20 °C (68 °F) - OECD Test Guideline 107 - Bioaccumulation is not expected.
p)	Autoignition temperature	460 °C (860 °F) at 1013.0 hPa - DIN 51794
q)	Decomposition temperature	Distillable in an undecomposed state at normal pressure.
r)	Viscosity	0.409 mm2/s at 40 °C (104 °F) - OECD Test Guideline 114 - 0.464 mm2/s at 20 °C (68 °F) - OECD Test Guideline 114 -
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

Surface tension	72.5 mN/m at 1.07g/l at 21.5 °C (70.7 °F) - Surface tension

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SECTION 10: Stability and reactivity

10.1 Reactivity
Vapors may form explosive mixture with air.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Violent reactions possible with:
Oxidizing agents
Strong acids
halogens
Strong bases

10.4 Conditions to avoid
Heat, flames and sparks.
Warming.

10.5 Incompatible materials
rubber, various plastics

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - > 2,000 mg/kg
(OECD Test Guideline 401)
Symptoms: Nausea, Vomiting, Pulmonary failure possible after aspiration of vomit., Aspiration may cause pulmonary edema and pneumonitis.
LC50 Inhalation - Rat - male and female - 4 h - 85 mg/l - vapor

(OECD Test Guideline 403)
Symptoms: Possible damages:, mucosal irritations
LD50 Dermal - Rat - male and female - > 2,000 mg/kg
(OECD Test Guideline 402)

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation - 4 h
(OECD Test Guideline 404)
Remarks: Drying-out effect resulting in rough and chapped skin.

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation

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(OECD Test Guideline 405)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster lung cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: Mutagenicity (mammal cell test): micronucleus.
Test system: mouse lymphoma cells
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 473
Result: negative

Test Type: unscheduled DNA synthesis assay
Species: Mouse
Cell type: Liver cells
Application Route: inhalation (vapor)
Method: OECD Test Guideline 486
Result: negative

Test Type: Micronucleus test
Species: Mouse
Cell type: Bone marrow
Application Route: inhalation (vapor)
Method: US-EPA
Result: negative

Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Species: Rat
Cell type: Bone marrow
Application Route: inhalation (vapor)
Method: US-EPA
Result: negative

Test Type: Transgenic rodent somatic cell gene mutation assay
Species: Rat
Cell type: Bone marrow
Application Route: inhalation (vapor)
Method: OECD Test Guideline 488
Result: negative

Carcinogenicity

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IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 90 d - NOAEL (No observed adverse effect level) - 3,000 mg/kg
Remarks: Subchronic toxicity

RTECS: KN5250000
Nausea, Vomiting, Dizziness, Central nervous system depression, Aspiration or inhalation may cause chemical pneumonitis., MTBE (methyl-tert-butyl ether) is reported to metabolize to tert-butyl alcohol and formaldehyde by microsomal demethylation, MTBE (methyl-tert-butyl ether) should be considered a "potential human carcinogen" due to an increase in leydig interstitial cell tumors of testes in male rats and an increase in lymphomas, leukemias, and uterine sarcomas in female rats., In another unpublished study MTBE was shown to be carcinogenic due to "increased incidence of a rare type of kidney tumor" in male rats and an "increase in the incidence of hepatocellular adenomas" in female mice.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Systemic effects:

After absorption of large quantities:

somnolence
Dizziness
agitation, spasms
CNS disorders
narcosis
Unconsciousness

Other dangerous properties can not be excluded.

Handle in accordance with good industrial hygiene and safety practice.

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operates as MilliporeSigma in the US and Canada

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	semi-static test LC50 - Menidia beryllina - 574 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	flow-through test EC50 - Americamysis bahia (Mysid) - 187 mg/l - 96 h (US-EPA OPPTS 850.1035)
Toxicity to algae	static test IC50 - Pseudokirchneriella subcapitata (green algae) - 491 mg/l - 96 h
Toxicity to bacteria	static test EC10 - Pseudomonas putida - 710 mg/l - 18 h Remarks: (ECHA)
Toxicity to fish(Chronic toxicity)	flow-through test NOEC - Pimephales promelas (fathead minnow) - 299 mg/l - 31 d Remarks: (ECHA)
	flow-through test NOEC - Pimephales promelas (fathead minnow) - 450 mg/l - 31 d Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	flow-through test NOEC - Daphnia magna (Water flea) - 51 mg/l - 21 d (OPPTS 850.1300)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 0 % - Not readily biodegradable. (OECD Test Guideline 301D)

12.3 Bioaccumulative potential

Bioaccumulation	Cyprinus carpio (Carp) - 28 d at 25 °C(tert-butyl methyl ether) Bioconcentration factor (BCF): 1.5

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 2398 Class: 3 Packing group: II
Proper shipping name: Methyl tert-butyl ether
Reportable Quantity (RQ): 1000 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 2398 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: METHYL tert-BUTYL ETHER

IATA
UN number: 2398 Class: 3 Packing group: II
Proper shipping name: Methyl tert-butyl ether

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
tert-butyl methyl ether	1634-04-4	1000	1000

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

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tert-butyl methyl ether	1634-04-4	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

tert-butyl methyl ether 1634-04-4

Pennsylvania Right To Know

tert-butyl methyl ether 1634-04-4

Maine Chemicals of High Concern

tert-butyl methyl ether 1634-04-4

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.15 Revision Date: 09/07/2024 Print Date: 09/08/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 5.5
Revision Date 06/02/2016
Print Date 06/21/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : *m*-Xylene

Product Number : 95670
Brand : Sigma-Aldrich
Index-No. : 601-022-00-9

CAS-No. : 108-38-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 3), H226
Acute toxicity, Dermal (Category 4), H312
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Aspiration hazard (Category 1), H304
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H226 Flammable liquid and vapour.
H304 May be fatal if swallowed and enters airways.
H312 Harmful in contact with skin.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.

H412	Harmful to aquatic life with long lasting effects.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	1,3-Dimethylbenzene
Formula	:	C_8H_{10}
Molecular weight	:	106.17 g/mol
CAS-No.	:	108-38-3
EC-No.	:	203-576-3
Index-No.	:	601-022-00-9

Hazardous components

Component	Classification	Concentration
m-Xylene		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; Asp. Tox. 1; Aquatic Acute 3; Aquatic Chronic 3; H226, H304, H312, H315, H319, H335, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
m-Xylene	108-38-3	TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100.000000 ppm 435.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	150.000000 ppm 655.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section)		

		Not classifiable as a human carcinogen		
		TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
m-Xylene	108-38-3	Methylhippuric acids	1.5g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
		Methylhippuric acids	1,500.0000 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 30 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -48 °C (-54 °F) - lit.
f)	Initial boiling point and boiling range	138 - 139 °C (280 - 282 °F) - lit.
g)	Flash point	25.0 °C (77.0 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 7 %(V) Lower explosion limit: 1.1 %(V)
k)	Vapour pressure	8.0 hPa (6.0 mmHg) at 20.0 °C (68.0 °F) 21.3 hPa (16.0 mmHg) at 37.7 °C (99.9 °F)
l)	Vapour density	No data available
m)	Relative density	0.868 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 3.2 at 20 °C (68 °F)
p)	Auto-ignition temperature	465.0 °C (869.0 °F) 528.0 °C (982.4 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available

t) Oxidizing properties No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male - 6,602 mg/kg
(OECD Test Guideline 401)

LC50 Inhalation - Rat - male - 4 h - 6700 ppm
(Directive 67/548/EEC, Annex V, B.2.)

LD50 Dermal - Rabbit - male - 12,126 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Severe eye irritation - 24 h

Respiratory or skin sensitisation
- Mouse
Result: Does not cause skin sensitisation.
(OECD Test Guideline 429)

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (m-Xylene)

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Specific target organ toxicity - single exposure
Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
May be fatal if swallowed and enters airways.

Additional Information
RTECS: ZE2275000

Liver injury may occur., Kidney injury may occur., Blood disorders, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, narcosis, Lung irritation, chest pain, pulmonary edema, Central nervous system depression, Dermatitis, Gastrointestinal disturbance

Kidney -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality LC50 - Fish - 11.23 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	Remarks: No data available
Toxicity to algae	Remarks: No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Due to the distribution coefficient n-octanol/water, accumulation in organisms is not expected.

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1307 Class: 3 Packing group: III
Proper shipping name: Xylenes
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1307 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: XYLENES

IATA
UN number: 1307 Class: 3 Packing group: III
Proper shipping name: Xylenes

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
m-Xylene	108-38-3	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
m-Xylene	108-38-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
m-Xylene	108-38-3	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
m-Xylene	108-38-3	2007-07-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Asp. Tox.	Aspiration hazard
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.

H304	May be fatal if swallowed and enters airways.
H312	Harmful in contact with skin.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.5 Revision Date: 06/02/2016 Print Date: 06/21/2016

SAFETY DATA SHEET

Version 6.12
Revision Date 09/07/2024
Print Date 09/08/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Naphthalene

Product Number : 147141
Brand : Aldrich
Index-No. : 601-052-00-2
CAS-No. : 91-20-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable solids (Category 2), H228
Carcinogenicity (Category 2), H351
Short-term (acute) aquatic hazard (Category 1), H400

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operates as MilliporeSigma in the US and Canada

Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Warning

Hazard Statements

H228	Flammable solid.
H351	Suspected of causing cancer.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	C10H8
Molecular weight	:	128.17 g/mol
CAS-No.	:	91-20-3
EC-No.	:	202-049-5
Index-No.	:	601-052-00-2

Component	Classification	Concentration
Naphthalene		
	Flam. Sol. 2; Carc. 2; Aquatic Acute 1; Aquatic Chronic 1; H228, H351, H400, H410	<= 100 %

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For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air on intense heating.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

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SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid inhalation of dusts. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep away from heat and sources of ignition.

Storage class
Storage class (TRGS 510): 4.1B: Flammable solid hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

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SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Naphthalene	91-20-3	TWA	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	10 ppm 50 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	15 ppm 75 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	10 ppm 50 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	0.1 ppm 0.5 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Naphthalene	91-20-3	1-Naphthol + 2-Naphthol			ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Nitrile rubber

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Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter A-(P3)
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: flakes, granules Color: white
b)	Odor	aromatic
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 80 - 82 °C (176 - 180 °F) - lit.
f)	Initial boiling point and boiling range	218 °C 424 °F - lit.
g)	Flash point	78.5 °C (173.3 °F) - closed cup - ISO 2719
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	The substance or mixture is a flammable solid with the category 2. - Flammability (solids)
j)	Upper/lower flammability or	Upper explosion limit: 5.9 %(V) Lower explosion limit: 0.9 %(V)

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	explosive limits	
k)	Vapor pressure	0.072 hPa at 20 °C (68 °F) - OECD Test Guideline 104
l)	Vapor density	No data available
m)	Density	1.08 g/cm3 at 24.7 °C (76.5 °F) - OECD Test Guideline 109
	Relative density	No data available
n)	Water solubility	0.0308 g/l at 25 °C (77 °F) - OECD Test Guideline 105 - slightly soluble
o)	Partition coefficient: n-octanol/water	log Pow: 3.4 at 25 °C (77 °F) - OECD Test Guideline 107 - Bioaccumulation is not expected.
p)	Autoignition temperature	526 - 587 °C (979 - 1089 °F) at 1,013 hPa - DIN 51794
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

Surface tension	31.8 mN/m at 100.0 °C (212.0 °F)

SECTION 10: Stability and reactivity

10.1 Reactivity

Forms explosive mixtures with air on intense heating.
A range from approx. 15 Kelvin below the flash point is to be rated as critical.
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions

Violent reactions possible with:
Oxidizing agents
chromium(VI) oxide
benzoyl chloride
aluminium chloride
Risk of explosion with:
nitrogen oxides

10.4 Conditions to avoid

Heat, flames and sparks.
Strong heating.

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10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
LC50 Inhalation - Rat - male and female - 4 h - > 0.4 mg/l - vapor

(OECD Test Guideline 403)
LD50 Dermal - Rabbit - 20,000 mg/kg
Remarks: (RTECS)

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 24 h
Remarks: (ECHA)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation - 24 h
Remarks: (ECHA)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: Chinese hamster ovary cells
Metabolic activation: Metabolic activation
Method: OECD Test Guideline 473
Result: positive
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative

Test Type: unscheduled DNA synthesis assay
Species: Rat
Cell type: Liver cells
Application Route: Oral
Method: OECD Test Guideline 486
Result: negative

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Test Type: Micronucleus test
Species: Mouse
Cell type: Bone marrow
Application Route: Intraperitoneal
Method: US-EPA
Result: negative
Remarks: (ECHA)

Carcinogenicity
Suspected of causing cancer.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Naphthalene)

No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. (Naphthalene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Naphthalene)

No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP. (Naphthalene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 91 Days - NOAEL (No observed adverse effect level) - 200 mg/kg - LOAEL (Lowest observed adverse effect level) - 400 mg/kg

Repeated dose toxicity - Mouse - male and female - Oral - 90 Days - NOAEL (No observed adverse effect level) - 100 mg/kg

Repeated dose toxicity - Rat - male and female - Dermal - 90 Days - NOAEL (No observed adverse effect level) - 1,000 mg/kg

Repeated dose toxicity - Rat - male and female - inhalation (vapor) - 90 Days - NOAEL (No observed adverse effect level) - 300 mg/kg

RTECS: QJ0525000
Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer., Naphthalene is retinotoxic and systemic absorption of its vapors above 15ppm, may result in:, cataracts,

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optic neuritis, corneal injury, Eye irritation, Ingestion may provoke the following symptoms:, hemolytic anemia, hemoglobinuria, Nausea, Headache, Vomiting, Gastrointestinal disturbance, Convulsions, anemia, Kidney injury may occur., Seizures., Coma.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After absorption:

Headache
Stomach/intestinal disorders
Tremors
Convulsions
Changes in the blood count

Other dangerous properties can not be excluded.

This substance should be handled with particular care.

Heart -

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Oncorhynchus mykiss (rainbow trout) - 1.6 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 2.16 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	static test EC50 - Pseudokirchneriella subcapitata (green algae) - 2.96 mg/l - 4 h (US-EPA) Remarks: (ECHA)
Toxicity to fish(Chronic toxicity)	flow-through test LC50 - Oncorhynchus kisutch (coho salmon) - 2.1 mg/l - 96 h Remarks: (ECHA)
	flow-through test NOEC - Oncorhynchus kisutch (coho salmon) - 0.37 mg/l - 40 Days Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	static test NOEC - Daphnia pulex (Water flea) - 0.59 mg/l - 125 d Remarks: (ECHA)

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12.2 Persistence and degradability

Biodegradability aerobic - Exposure time 28 d
Result: 2 % - Not readily biodegradable.
(OECD Test Guideline 302C)

12.3 Bioaccumulative potential

Bioaccumulation Cyprinus carpio (Carp) - 56 d
at 25 °C(Naphthalene)

Bioconcentration factor (BCF): 36.5 - 168
(OECD Test Guideline 305)

Remarks: Bioaccumulation is unlikely.

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)

UN number: 1334 Class: 4.1 Packing group: III
Proper shipping name: Naphthalene, refined
Reportable Quantity (RQ): 100 lbs
Marine pollutant: yes Poison Inhalation Hazard: No

IMDG

UN number: 1334 Class: 4.1 Packing group: III EMS-No: F-A, S-G
Proper shipping name: NAPHTHALENE, REFINED

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Marine pollutant : yes

IATA
UN number: 1334 Class: 4.1 Packing group: III
Proper shipping name: Naphthalene, refined

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Naphthalene	91-20-3	100	100

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know

Naphthalene 91-20-3

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

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SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.12 Revision Date: 09/07/2024 Print Date: 09/08/2024

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SAFETY DATA SHEET

Revision Date 03-May-2012 **Revision Number** 2

SECTION 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product Identifier

Product Description: **n-Butylbenzene**
Cat No. **107850000; 107850050; 107850500; 107852500**
Synonyms 1-Phenylbutane

Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Laboratory chemicals
Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Acros Organics BVBA
Janssen Pharmaceuticalaan 3a
2440 Geel, Belgium
E-mail address begel.sdsdesk@thermofisher.com

Emergency Telephone Number

For information in the US, call: 001-800-ACROS-01
For information in Europe, call: +32 14 57 52 11

Emergency Number, Europe: +32 14 57 52 99
Emergency Number, US: 001-201-796-7100

CHEMTREC Phone Number, US: 001-800-424-9300
CHEMTREC Phone Number, Europe: 001-703-527-3887

SECTION 2. HAZARDS IDENTIFICATION

Classification of the substance or mixture

REGULATION (EC) No 1272/2008

Flammable liquids.	Category 3

Classification according to EU Directives 67/548/EEC or 1999/45/EC

For the full text of the R-phrases and H-Statements mentioned in this Section, see Section 16

R-phrase(s) none

Label Elements

SECTION 2. HAZARDS IDENTIFICATION



Signal Word **Warning**

Hazard Statements
H226 - Flammable liquid and vapor

Precautionary Statements - EU (§28, 1272/2008)
P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking

Other Hazards

No information available.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	EC-No.	Weight %	CAS-No	67/548/EEC Classification	CLP Classification - Regulation (EC) No 1272/2008	REACH No.
Butyl benzene 104-51-8	EEC No. 203-209-7	> 99	104-51-8	-	Flam. Liq. 3 (H226)	-

For the full text of the R-phrases and H-Statements mentioned in this Section, see Section 16

SECTION 4. FIRST AID MEASURES

Description of first aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Obtain medical attention.

Ingestion Do not induce vomiting. Clean mouth with water. Aspiration hazard. Get medical attention.

Inhalation Remove from exposure, lie down. Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Obtain medical attention.

Notes to Physician Treat symptomatically

SECTION 5. FIRE-FIGHTING MEASURES

Extinguishing media

Suitable Extinguishing Media
Water spray. Carbon dioxide (CO_2). Dry chemical. Use water spray to cool unopened containers. chemical foam. Do not use a solid water stream as it may scatter and spread fire.

Extinguishing media which must not be used for safety reasons
No information available.

Special hazards arising from the substance or mixture

Combustible material. Flammable. Vapors may travel to source of ignition and flash back. Containers may explode when heated.

Advice for fire-fighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Ensure adequate ventilation

Environmental precautions

Prevent further leakage or spillage if safe to do so

Methods and material for containment and cleaning up

Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal.. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

SECTION 7. HANDLING AND STORAGE

Precautions for Safe Handling

Avoid contact with skin and eyes. Do not breathe dust. Do not breathe vapors or spray mist. Use explosion-proof equipment. Use only non-sparking tools.

Conditions for safe storage, including any incompatibilities

Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat and sources of ignition.

Specific End Uses

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure limits	This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.
Biological limit values	This product, as supplied, does not contain any hazardous materials with biological limits established by the region specific regulatory bodies.
Derived No Effect Level (DNEL)	No information available.
Predicted No Effect Concentration (PNEC)	No information available.

Exposure controls

Engineering Measures	Ensure adequate ventilation, especially in confined areas
Personal protective equipment	
Eye Protection	Goggles
Hand Protection	Protective gloves
Skin and body protection	Wear appropriate protective gloves and clothing to prevent skin exposure
Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced
Hygiene Measures	Handle in accordance with good industrial hygiene and safety practice
Environmental exposure controls	No information available.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid
Appearance	Colorless
odor	odorless
pH	No information available.
Vapor Pressure	1.33 hPa @ 23 °C
Vapor Density	4.6
Boiling Point/Range	183°C / 361.4°F@ 760 mmHg
Melting Point/Range	-88°C / -126.4°F
Flash Point	59°C / 138.2°F
Autoignition Temperature	412°C / 773.6°F
Explosion Limits	
Lower	0.8
Upper	5.8
Water Solubility	Insoluble
Specific Gravity	0.860
Molecular Formula	C10 H14
Molecular Weight	134.22

SECTION 10. STABILITY AND REACTIVITY

Reactivity

Chemical Stability

Stable under normal conditions.

Possibility of Hazardous Reactions

Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions .	No information available.

Conditions to Avoid

Keep away from open flames, hot surfaces and sources of ignition, Incompatible products.

Incompatible Materials

Strong oxidizing agents, oxygen.

Hazardous Decomposition Products

Carbon monoxide (CO). Carbon dioxide (CO_2).

SECTION 11. TOXICOLOGICAL INFORMATION

Information on Toxicological Effects

Acute Toxicity

Product Information	No acute toxicity information is available for this product

Component Information

Chronic Toxicity

Carcinogenicity	There are no known carcinogenic chemicals in this product
Sensitization	No information available.
Mutagenic Effects	No information available
Reproductive Effects	No information available.
Developmental Effects	No information available.
Target Organs	No information available.
Other Adverse Effects	The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information

Endocrine Disruptor Information

SECTION 11. TOXICOLOGICAL INFORMATION

Component	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Butyl benzene	Group III Chemical		

SECTION 12. ECOLOGICAL INFORMATION

Toxicity

Ecotoxicity effects Contains no substances known to be hazardous to the environment or that are not degradable in waste water treatment plants

Persistence and degradability

No information available

Bioaccumulative potential

No information available.

Component	log Pow
Butyl benzene	4.2

Mobility in soil

Results of PBT and vPvB assessment

Other adverse effects

No information available

SECTION 13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Waste from Residues / Unused Products Dispose of in accordance with local regulations

Contaminated Packaging Empty containers should be taken to local recyclers for disposal

SECTION 14. TRANSPORT INFORMATION

IMDG/IMO

SECTION 14. TRANSPORT INFORMATION

UN-No	2709
Hazard Class	3
Packing Group	III
Proper Shipping Name	BUTYLBENZENES

ADR

UN-No	2709
Hazard Class	3
Packing Group	III
Proper Shipping Name	BUTYLBENZENES

IATA

UN-No	2709
Hazard Class	3
Packing Group	III
Proper Shipping Name	BUTYLBENZENES

SECTION 15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories

Component	EINECS	ELINCS	NLP	TSCA	DSL	NDSL	PICCS	ENCS	CHINA	AICS	KECL
Butyl benzene	203-209-7	-		X	X	-	X	X	X	X	-

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
PICCS - Philippines Inventory of Chemicals and Chemical Substances
ENCS - Japan Existing and New Chemical Substances
CHINA - China Inventory of Existing Chemical Substances
AICS - Inventory of Chemical Substances
KECL - Existing and Evaluated Chemical Substances

Chemical Safety Assessment

SECTION 16. OTHER INFORMATION

Full text of R-phrases referred to under sections 2 and 3
No information available.

Revision Date 03-May-2012
Revision Summary

Reason for revision Not applicable
This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006
Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of Safety Data Sheet

Safety data sheet

according to 1907/2006/EC, Article 31

Printing date 24.08.2020 *Version number 1* *Revision: 24.08.2020*

SECTION 1: Identification of the substance/mixture and of the company/undertaking

· **1.1 Product identifier**

· **Product name:** **N-Ethyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide**

· **Part number:** DRE-C13342360
· **CAS Number:**
1691-99-2
· **EC number:**
216-887-4
· **1.2 Relevant identified uses of the substance or mixture and uses advised against**
No further relevant information available.
· **Application of the substance / the mixture** Reference material for laboratory use only

· **1.3 Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
LGC Limited
Queens Road
Teddington
Middlesex TW11 0LY
UNITED KINGDOM

Tel :+44 (0) 20 8943 7000
Fax :+44 (0) 20 8943 2767
eMail : gb@lgcstandards.com
Web : www.lgcstandards.com

· **Further information obtainable from:**
Product safety department
eMail : sds-request@lgcgroup.com
· **1.4 Emergency telephone number:**
For Hazardous Materials or Dangerous Goods Incident
Spill, Leak, Fire Exposure, or Accident
Call CHEMTREC:
USA & Canada 1-800-424-9300
Rest of the world +1 703-741-5970

SECTION 2: Hazards identification

· **2.1 Classification of the substance or mixture**
· **Classification according to Regulation (EC) No 1272/2008**



GHS06 skull and crossbones

Acute Tox. 3	H301	Toxic if swallowed.



GHS08 health hazard

Carc. 2	H351	Suspected of causing cancer.
Repr. 1B	H360D-H362	May damage the unborn child. May cause harm to breast-fed children.
STOT RE 1	H372	Causes damage to organs through prolonged or repeated exposure.

(Contd. on page 2)

Safety data sheet

according to 1907/2006/EC, Article 31

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***Product name:* N-Ethyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide**

(Contd. from page 1)



GHS09 environment

Aquatic Chronic 2 H411 *Toxic to aquatic life with long lasting effects.*



GHS07

Acute Tox. 4 H332 *Harmful if inhaled.*

· ***2.2 Label elements***

· ***Labelling according to Regulation (EC) No 1272/2008***

The substance is classified and labelled according to the CLP regulation.

· ***Hazard pictograms***



GHS06 GHS08 GHS09

· ***Signal word*** *Danger*

· ***Hazard statements***

H301 *Toxic if swallowed.*
H332 *Harmful if inhaled.*
H351 *Suspected of causing cancer.*
H360D-H362 *May damage the unborn child. May cause harm to breast-fed children.*
H372 *Causes damage to organs through prolonged or repeated exposure.*
H411 *Toxic to aquatic life with long lasting effects.*

· ***Precautionary statements***

P260 *Do not breathe dusts or mists.*
P263 *Avoid contact during pregnancy and while nursing.*
P280 *Wear protective gloves/protective clothing/eye protection/face protection.*
P301+P310 *IF SWALLOWED: Immediately call a POISON CENTER/ doctor.*
P405 *Store locked up.*
P501 *Dispose of contents/container in accordance with local/regional/national/international regulations.*

· ***Additional information:***

Restricted to professional users.

· ***2.3 Other hazards***

· ***Results of PBT and vPvB assessment***

· ***PBT:*** *Not applicable.*

· ***vPvB:*** *Not applicable.*

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Product name: **N-Ethyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide**

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SECTION 3: Composition/information on ingredients

· **3.1 Chemical characterisation: Substances**
· **CAS No. Description**
1691-99-2 N-Ethyl perfluorooctane sulfonamide ethanol
· **Identification number(s)** None
· **EC number:** 216-887-4
· **RTECS:** RG9701350
· **Additional information:** For the wording of the listed hazard phrases refer to section 16.

SECTION 4: First aid measures

· **4.1 Description of first aid measures**
· **General information:**
Immediately remove any clothing soiled by the product.
Symptoms of poisoning may occur even after several hours; therefore medical observation for at least 48 hours after the accident is recommended.
In case of irregular breathing or respiratory arrest provide artificial respiration.
· **After inhalation:**
Supply fresh air. If required, provide artificial respiration. Keep patient warm. Consult doctor if symptoms persist.
In case of unconsciousness place patient in recovery position for transport.
Seek medical treatment.
· **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
· **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
· **After swallowing:**
Rinse mouth. Do not induce vomiting.
Call for a doctor immediately.
· **4.2 Most important symptoms and effects, both acute and delayed** No further relevant information available.
· **4.3 Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

SECTION 5: Firefighting measures

· **5.1 Extinguishing media**
· **Suitable extinguishing agents:** Use fire extinguishing methods suitable for surrounding conditions.
· **5.2 Special hazards arising from the substance or mixture**
Formation of toxic gases is possible during heating or in case of fire.
· **5.3 Advice for firefighters**
· **Protective equipment:**
Mouth respiratory protective device.
Wear self-contained respiratory protective device.

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SECTION 6: Accidental release measures

· **6.1 Personal precautions, protective equipment and emergency procedures** Avoid formation of dust.
· **6.2 Environmental precautions:**
Inform respective authorities in case of seepage into water course or sewage system.
Do not allow to enter sewers/ surface or ground water.
· **6.3 Methods and material for containment and cleaning up:**
Dispose of contaminated material as waste according to item 13.
Ensure adequate ventilation.
· **6.4 Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

SECTION 7: Handling and storage

· **7.1 Precautions for safe handling**
Ensure good ventilation/extraction at the workplace.
Remove dust thoroughly.
Store in cool, dry place in tightly closed receptacles.
· **Information about fire - and explosion protection:** No special measures required.

· **7.2 Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:**
Please refer to the manufacturer's certificate for specific storage and transport temperature conditions.
Store only in the original receptacle unless other advice is given on the CoA.
Keep container in a well-ventilated place. Keep away from sources of ignition and heat.
· **Information about storage in one common storage facility:** Store away from foodstuffs.
· **Further information about storage conditions:** Keep container tightly sealed.
· **7.3 Specific end use(s)** No further relevant information available.

SECTION 8: Exposure controls/personal protection

· **Additional information about design of technical facilities:** No further data; see item 7.

· **8.1 Control parameters**
· **Ingredients with limit values that require monitoring at the workplace:** Not required.
· **Additional information:** Lists used were valid at the time of SDS preparation.

· **8.2 Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing
Wash hands before breaks and at the end of work.
Store protective clothing separately.

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· ***Respiratory protection:***
In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use self-contained respiratory protective device.
· ***Protection of hands:***
The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation
The protective gloves to be used must comply with the specifications of EC Directive 89/686/EEC and the related standard EN374



Protective gloves

· ***Material of gloves*** *Fluorocarbon rubber (Viton)*
· ***Penetration time of glove material***
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
· ***Eye protection:***



Tightly sealed goggles

SECTION 9: Physical and chemical properties

· ***9.1 Information on basic physical and chemical properties***	
· ***General Information***	
· ***Appearance:***	
Form:	*Solid*
Colour:	*White*
· ***Odour:***	*Odourless*
· ***Odour threshold:***	*Not determined.*
· ***pH-value:***	*Not applicable.*
· ***Change in condition***	
Melting point/freezing point:	*55-60 °C*
Initial boiling point and boiling range:	*Not determined.*
· ***Flash point:***	*Not applicable.*
· ***Flammability (solid, gas):***	*Not determined.*
· ***Ignition temperature:***	*Not determined*
· ***Decomposition temperature:***	*Not determined.*
· ***Auto-ignition temperature:***	*Not determined.*

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Product name: **N-Ethyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide**

(Contd. from page 5)

· ***Explosive properties:***	*Not determined.*
· ***Explosion limits:***	
Lower:	*Not determined.*
Upper:	*Not determined.*
· ***Vapour pressure:***	*Not applicable.*
· ***Density:***	*Not determined.*
· ***Relative density***	*Not determined.*
· ***Vapour density***	*Not applicable.*
· ***Evaporation rate***	*Not applicable.*
· ***Solubility in / Miscibility with***	*Chloroform (Slightly), DMSO, Ethyl Acetate (Slightly), Methanol (Slightly)*
· ***water:***	*Not determined.*
· ***Partition coefficient: n-octanol/water:***	*Not determined.*
· ***Viscosity:***	
Dynamic:	*Not applicable.*
Kinematic:	*Not applicable.*
· ***9.2 Other information***	*No further relevant information available.*

SECTION 10: Stability and reactivity

· ***10.1 Reactivity***
Stable under normal conditions.
No further relevant information available.
· ***10.2 Chemical stability*** *Stable under normal conditions.*
· ***Thermal decomposition / conditions to be avoided:***
Formation of toxic gases is possible during heating or in case of fire.
· ***10.3 Possibility of hazardous reactions*** *No dangerous reactions known.*
· ***10.4 Conditions to avoid*** *Heat.*
· ***10.5 Incompatible materials:*** *Strong oxidizing agents.*
· ***10.6 Hazardous decomposition products:***
Formation of toxic gases is possible during heating or in case of fire.

SECTION 11: Toxicological information

· ***11.1 Information on toxicological effects***
· ***Acute toxicity***
Toxic if swallowed.
Harmful if inhaled.
· ***Primary irritant effect:***
· ***Skin corrosion/irritation*** *Based on available data, the classification criteria are not met.*
· ***Serious eye damage/irritation*** *Based on available data, the classification criteria are not met.*
· ***Respiratory or skin sensitisation*** *Based on available data, the classification criteria are not met.*

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· ***CMR effects (carcinogenity, mutagenicity and toxicity for reproduction)***
Carc. 2, Repr. 1B
· ***Germ cell mutagenicity*** *Based on available data, the classification criteria are not met.*
· ***Carcinogenicity***
Suspected of causing cancer.
· ***Reproductive toxicity***
May damage the unborn child. May cause harm to breast-fed children.
· ***STOT-single exposure*** *Based on available data, the classification criteria are not met.*
· ***STOT-repeated exposure***
Causes damage to organs through prolonged or repeated exposure.
· ***Aspiration hazard*** *Based on available data, the classification criteria are not met.*

SECTION 12: Ecological information

· ***12.1 Toxicity***
· ***Aquatic toxicity:*** *No further relevant information available.*
· ***12.2 Persistence and degradability*** *No further relevant information available.*
· ***12.3 Bioaccumulative potential*** *No further relevant information available.*
· ***12.4 Mobility in soil*** *No further relevant information available.*
· ***Ecotoxicological effects:***
· ***Remark:*** *Toxic for fish*
· ***Additional ecological information:***
· ***General notes:***
Water hazard class 3 (German Regulation) (Self-assessment): extremely hazardous for water
Do not allow product to reach ground water, water course or sewage system, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.
Also poisonous for fish and plankton in water bodies.
Toxic for aquatic organisms
· ***12.5 Results of PBT and vPvB assessment***
· ***PBT:*** *Not applicable.*
· ***vPvB:*** *Not applicable.*
· ***12.6 Other adverse effects*** *No further relevant information available.*

SECTION 13: Disposal considerations

· ***13.1 Waste treatment methods***
· ***Recommendation***
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.
· ***European waste catalogue***
Waste disposal key numbers from EWC have to be assigned depending on origin and processing.

· ***Uncleaned packaging:***
· ***Recommendation:*** *Dispose of in accordance with national regulations.*

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Safety data sheet

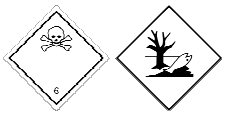
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Product name: **N-Ethyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide**

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SECTION 14: Transport information

· ***14.1 UN-Number***	
· ***ADR, IMDG, IATA***	*UN2811*
· ***ADR***	*2811 TOXIC SOLID, ORGANIC, N.O.S. (N-Ethyl perfluorooctane sulfonamide ethanol), ENVIRONMENTALLY HAZARDOUS*
· ***IMDG***	*TOXIC SOLID, ORGANIC, N.O.S. (N-Ethyl perfluorooctane sulfonamide ethanol), MARINE POLLUTANT*
· ***IATA***	*TOXIC SOLID, ORGANIC, N.O.S. (N-Ethyl perfluorooctane sulfonamide ethanol)*
· ***14.3 Transport hazard class(es)***	
· ***ADR, IMDG***	
· ***Class***	*6.1 Toxic substances.*
· ***Label***	*6.1*
· ***IATA***	
· ***Class***	*6.1 Toxic substances.*
· ***Label***	*6.1*
· ***14.4 Packing group***	
· ***ADR, IMDG, IATA***	*III*
· ***14.5 Environmental hazards:***	*Environmentally hazardous substance, solid; Marine Pollutant*
· ***Marine pollutant:***	*Symbol (fish and tree)*
· ***Special marking (ADR):***	*Symbol (fish and tree)*
· ***14.6 Special precautions for user***	*Warning: Toxic substances.*
· ***Danger code (Kemler):***	*60*
· ***EMS Number:***	*F-A,S-A*
· ***Stowage Category***	*A*
· ***14.7 Transport in bulk according to Annex II of Marpol and the IBC Code***	*Not applicable.*

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Safety data sheet
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Product name: **N-Ethyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide**

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· ***Transport/Additional information:***

· ***ADR***	
· ***Limited quantities (LQ)***	*5 kg*
· ***Excepted quantities (EQ)***	*Code: E1* *Maximum net quantity per inner packaging: 30 g* *Maximum net quantity per outer packaging: 1000 g*
· ***Transport category***	*2*
· ***Tunnel restriction code***	*E*
· ***UN "Model Regulation":***	*UN 2811 TOXIC SOLID, ORGANIC, N.O.S. (N-ETHYL PERFLUOROOCTANE SULFONAMIDE ETHANOL), 6.1, III, ENVIRONMENTALLY HAZARDOUS*

SECTION 15: Regulatory information

· ***15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture***

· ***Directive 2012/18/EU***
· ***Named dangerous substances - ANNEX I*** *Substance is not listed.*
· ***Seveso category*** *E2 Hazardous to the Aquatic Environment*
· ***Qualifying quantity (tonnes) for the application of lower-tier requirements*** *200 t*
· ***Qualifying quantity (tonnes) for the application of upper-tier requirements*** *500 t*
· ***Regulation (EU) No 649/2012***
Annex I Part 1
Annex I Part 3
· ***15.2 Chemical safety assessment:*** *A Chemical Safety Assessment has not been carried out.*

SECTION 16: Other information

The information in this safety data sheet (SDS) has been prepared with due care and is true and accurate to the best of our knowledge. The user must determine the suitability of the information for its particular purpose, ensure compliance with existing laws and regulations, and be aware that other or additional safety or performance considerations may arise when using, handling and/ or storing the material. The information in this SDS does not purport to be all inclusive or a guarantee as to the properties of the material supplied, and should be used only as a guide. LGC makes no warranties or representations as to the accuracy and completeness of the information contained herein, shall not be held responsible for the suitability of this information for the user's intended purposes or the consequences of such use, and shall not be liable for any damage or loss, howsoever arising, direct or otherwise.

· ***Abbreviations and acronyms:***
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
IATA: International Air Transport Association
GHS: Globally Harmonised System of Classification and Labelling of Chemicals
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
PBT: Persistent, Bioaccumulative and Toxic

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vPvB: very Persistent and very Bioaccumulative
Acute Tox. 3: Acute toxicity – Category 3
Acute Tox. 4: Acute toxicity – Category 4
Carc. 2: Carcinogenicity – Category 2
Repr. 1B: Reproductive toxicity – Category 1B
STOT RE 1: Specific target organ toxicity (repeated exposure) – Category 1
Aquatic Chronic 2: Hazardous to the aquatic environment - long-term aquatic hazard – Category 2

· ***Sources***
Tables 3.1 and 3.2 from Annex 6 of EC 1272/2008, EC 1907/2006, EH40/2005 as amended 2011, Registry of Toxic Effects of Chemical Substances (RTECS), The Dictionary of Substances and their Effects, 1st Edition, IUCLID.

· ***Data compared to the previous version altered.*** *All sections have been updated.*

SAFETY DATA SHEET

Creation Date 26-Oct-2009 **Revision Date** 02-Apr-2014 **Revision Number** 1

1. Identification

Product Name **n-Hexane**

Cat No. : **AC326920000; AC326920010; AC326920025; AC326921000; AC326922500**

Synonyms Hex

Recommended Use Laboratory chemicals

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 /
Europe call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 /
Europe: +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 /
Europe:001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 2
Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Reproductive Toxicity	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system, Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 1
Target Organs - Liver, Heart, Blood.	
Aspiration Toxicity	Category 1

Label Elements

Signal Word
Danger

Hazard Statements
Highly flammable liquid and vapor

May be fatal if swallowed and enters airways
Causes skin irritation
Causes serious eye irritation
May cause respiratory irritation
May cause drowsiness or dizziness
Suspected of damaging fertility
Causes damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Wear eye/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Keep cool
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
If skin irritation occurs: Get medical advice/attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention.
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Do NOT induce vomiting
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)
Toxic to aquatic life with long lasting effects

3. Composition / information on ingredients

Haz/Non-haz

Component	CAS-No	Weight %
Hexane	110-54-3	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Obtain medical attention. Aspiration into lungs can produce severe lung damage.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately. If vomiting occurs, lean victim forward to reduce the risk of aspiration.

Most important symptoms/effects Breathing difficulties. . Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting.

Notes to Physician Treat symptomatically.

5. Fire-fighting measures

Suitable Extinguishing Media CO_2, dry chemical, dry sand, alcohol-resistant foam. Cool closed containers exposed to fire with water spray.

Unsuitable Extinguishing Media Water may be ineffective, This material is lighter than water and insoluble in water. The fire could easily be spread by the use of water in an area where the water cannot be contained.

Flash Point -22°C / -7.6°F

Method - No information available

Autoignition Temperature 223°C / 433.4°F

Explosion Limits

Upper 7.5 vol %

Lower 1.1 vol %

Sensitivity to Mechanical Impact No information available

Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical

Flammable. Risk of ignition. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Containers may explode when heated.

Hazardous Combustion Products Carbon monoxide (CO), Carbon dioxide (CO_2).

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
2	3	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Evacuate personnel to safe areas. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions Do not flush into surface water or sanitary sewer system. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment. Take precautionary measures against static discharges.

7. Handling and storage

Handling Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Do not breathe vapors or spray mist. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Use explosion-proof equipment. Take precautionary measures against static discharges. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Flammables area.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Hexane	TWA: 50 ppm Skin	(Vacated) TWA: 50 ppm (Vacated) TWA: 180 mg/m^3 TWA: 500 ppm TWA: 1800 mg/m^3	IDLH: 1100 ppm TWA: 50 ppm TWA: 180 mg/m^3

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Hexane	TWA: 50 ppm TWA: 176 mg/m^3 Skin	TWA: 50 ppm TWA: 176 mg/m^3	TWA: 50 ppm Skin

Legend
ACGIH *- American Conference of Governmental Hygienists*
OSHA *- Occupational Safety and Health Administration*
NIOSH IDLH: *The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health*

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location. Use explosion-proof electrical/ventilating/lighting/equipment.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	Petroleum distillates
Odor Threshold	No information available.
pH	No information available.
Melting Point/Range	-95°C / -139°F
Boiling Point/Range	69°C / 156.2°F@ 760 mmHg
Flash Point	-22°C / -7.6°F
Evaporation Rate	No information available.
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	7.5 vol %
Lower	1.1 vol %
Vapor Pressure	160 mbar @ 20 °C
Vapor Density	2.97
Relative Density	0.659
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	223°C / 433.4°F
Decomposition temperature	No information available.
Viscosity	0.31 mPa s at 20 °C
Molecular Formula	C6 H14
Molecular Weight	86.18

10. Stability and reactivity

Reactive Hazard None known, based on information available.

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Heat, flames and sparks. Exposure to light. Keep away from open flames, hot surfaces and sources of ignition.

Incompatible Materials Strong oxidizing agents, Halogens

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur

Hazardous Reactions None under normal processing

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Hexane	25 g/kg (Rat)	3000 mg/kg (Rabbit)	48000 ppm (Rat) 4 h

Toxicologically Synergistic Products No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes and skin

Sensitization No information available.

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Hexane	110-54-3	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects Mutagenic effects have occurred in experimental animals.

Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects Developmental effects have occurred in experimental animals.

Teratogenicity Teratogenic effects have occurred in experimental animals..

STOT - single exposure Respiratory system, Central nervous system (CNS).

STOT - repeated exposure Liver, Heart, Blood.

Aspiration hazard No information available.

Symptoms / effects, both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting.

Endocrine Disruptor Information No information available

Other Adverse Effects Tumorigenic effects have been reported in experimental animals.. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Hexane	Not listed	2.1 - 2.98 mg/L LC50 96 h	Not listed	EC50: 3.87 mg/L/48h

Persistence and Degradability Persistence is unlikely, based on information available.

Bioaccumulation/ Accumulation No information available

Mobility Will likely be mobile in the environment due to its volatility.

Component	log Pow
Hexane	4.11

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No	UN1208
Proper Shipping Name	Hexanes
Hazard Class	3
Packing Group	II

TDG

UN-No	UN1208
Proper Shipping Name	HEXANES
Hazard Class	3
Packing Group	II

IATA

UN-No	UN1208
Proper Shipping Name	Hexanes
Hazard Class	3
Packing Group	II

IMDG/IMO

UN-No	UN1208
Proper Shipping Name	Hexanes
Hazard Class	3
Packing Group	II

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Hexane	X	X	-	203-777-6	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Hexane	110-54-3	>95	1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act Not applicable

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Hexane	X		-

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Hexane	5000 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals.

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Hexane	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ):	Y
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

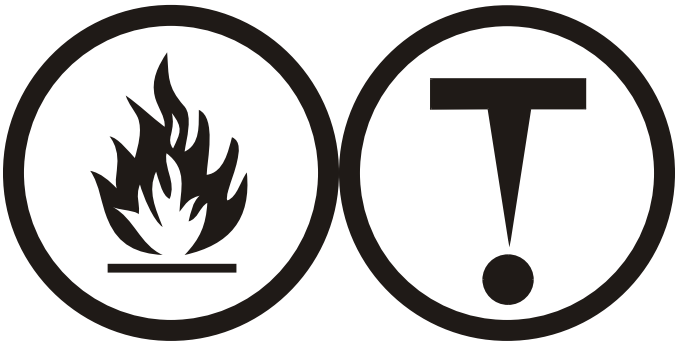
U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade Serious risk, Grade 3

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class B2 Flammable liquid
D2A Very toxic materials



16. Other information

Prepared By	Regulatory Affairs Thermo Fisher Scientific Email: EMSDS.RA@thermofisher.com
Creation Date	26-Oct-2009
Revision Date	02-Apr-2014
Print Date	02-Apr-2014
Revision Summary	This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

SAFETY DATA SHEET

Creation Date 04-Oct-2010 **Revision Date** 10-Feb-2015 **Revision Number** 1

1. Identification

Product Name **Nickel, powder**

Cat No. : **AC193610000; AC193610250; AC193611000; AC193615000**

Synonyms Raney alloy

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Sensitization	Category 1
Carcinogenicity	Category 2
Specific target organ toxicity - (repeated exposure)	Category 1
Target Organs - Kidney, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
May cause an allergic skin reaction
Causes damage to organs through prolonged or repeated exposure
Suspected of causing cancer



Precautionary Statements

Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Wear protective gloves/protective clothing/eye protection/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Contaminated work clothing should not be allowed out of the workplace
Response
IF exposed or concerned: Get medical attention/advice
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation or rash occurs: Get medical advice/attention
Wash contaminated clothing before reuse
Storage
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Harmful to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
Nickel powder	7440-02-0	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Immediate medical attention is required.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately.

Most important symptoms/effects May cause allergic skin reaction. Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature 400 °C / 752 °F
Explosion Limits
Upper No data available
Lower No data available

Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Combustible material.

Hazardous Combustion Products
Nickel oxides.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
3	1	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas. Avoid dust formation.

Environmental Precautions Should not be released into the environment. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Sweep up or vacuum up spillage and collect in suitable container for disposal. Avoid dust formation.

7. Handling and storage

Handling Use only under a chemical fume hood. Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Avoid dust formation. Do not breathe vapors/dust. Do not ingest.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Nickel powder	TWA: 1.5 mg/m³	(Vacated) TWA: 1 mg/m³ TWA: 1 mg/m³	IDLH: 10 mg/m³ TWA: 0.015 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Nickel powder	TWA: 1 mg/m³	TWA: 1 mg/m³	TWA: 1 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	Brown
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	1455 °C / 2651 °F
Boiling Point/Range	2730 °C / 4946 °F
Flash Point	No information available
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	1 mmHg @ 1810 °C
Vapor Density	No information available
Relative Density	No information available
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	400 °C / 752 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	Ni
Molecular Weight	58.7

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Avoid dust formation.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products Nickel oxides

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Nickel powder	9000 mg/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization May cause sensitization by skin contact Nickel and nickel compounds may cause a form of dermatitis known as nickel itch. May cause an allergic skin reaction

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Nickel powder	7440-02-0	Group 2B	Reasonably Anticipated	Not listed	X	Not listed

IARC: (International Agency for Research on Cancer) *Group 2B - Possibly Carcinogenic to Humans*

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure Kidney Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing
Endocrine Disruptor Information No information available

Other Adverse Effects See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity
Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Do not empty into drains. Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Nickel powder	0.18 mg/L EC50 = 72 h 0.174 - 0.311 mg/L EC50 96 h	10.4 mg/L LC50 96 h 1.3 mg/L LC50 96 h 100 mg/L LC50 96 h	Not listed	1 mg/L EC50 = 48 h 100 mg/L EC50 > 48 h

Persistence and Degradability No information available
Bioaccumulation/ Accumulation No information available.

Mobility No information available.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT
- **UN-No** UN3089
- **Proper Shipping Name** METAL POWDERS, FLAMMABLE, N.O.S.
- **Hazard Class** 4.1
- **Packing Group** II

TDG
- **UN-No** UN3089
- **Proper Shipping Name** METAL POWDERS, FLAMMABLE, N.O.S.
- **Hazard Class** 4.1
- **Packing Group** II

IATA

UN-No	3089
Proper Shipping Name	METAL POWDERS, FLAMMABLE, N.O.S.
Hazard Class	4.1
Packing Group	II

IMDG/IMO

UN-No	3089
Proper Shipping Name	METAL POWDERS, FLAMMABLE, N.O.S.
Hazard Class	4.1
Packing Group	II

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Nickel powder	X	X	-	231-111-4	-		X	-	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Nickel powder	7440-02-0	>95	0.1

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Nickel powder	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Nickel powder	X		-

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive

Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Nickel powder	100 lb	-

California Proposition 65 This product contains the following Proposition 65 chemicals:

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Nickel powder	7440-02-0	Carcinogen	-	Carcinogen

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Nickel powder	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class D2A Very toxic materials



16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 04-Oct-2010
Revision Date 10-Feb-2015
Print Date 10-Feb-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

Safety Data Sheet
acc. to OSHA HCS

Printing date 03/28/2019 Version Number 3 Reviewed on 03/23/2019

*

1 Identification

· **Product identifier**

· **Trade name: n-Propylbenzene Standard (1X1 mL)**

· **Part number:** EPA-1045-1
· **Application of the substance / the mixture** Reagents and Standards for Analytical Chemical Laboratory Use

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
Agilent Technologies, Inc.
5301 Stevens Creek Blvd.
Santa Clara, CA 95051 USA

· **Information department:**
Telephone: 800-227-9770
e-mail: pdl-msds_author@agilent.com
· **Emergency telephone number:** CHEMTREC®: 1-800-424-9300

2 Hazard(s) identification

· **Classification of the substance or mixture**


GHS02 Flame

Flam. Liq. 2 H225 Highly flammable liquid and vapor.


GHS06 Skull and crossbones

Acute Tox. 3 H331 Toxic if inhaled.


GHS08 Health hazard

Carc. 2 H351 Suspected of causing cancer.
STOT SE 1 H370 Causes damage to organs.

· **Label elements**
· **GHS label elements** The product is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms**


GHS02 GHS06 GHS08

· **Signal word** Danger

· **Hazard-determining components of labeling:**
methanol
· **Hazard statements**
Highly flammable liquid and vapor.
Toxic if inhaled.
Suspected of causing cancer.

(Contd. on page 2)

Safety Data Sheet
acc. to OSHA HCS

Trade name: n-Propylbenzene Standard (1X1 mL)

(Contd. of page 1)

Causes damage to organs.

· **Precautionary statements**
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilating/lighting/equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Do not breathe dust/fume/gas/mist/vapors/spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
IF exposed or concerned: Get medical advice/attention.
Specific treatment (see on this label).
In case of fire: Use for extinction: CO2, powder or water spray.
Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.
Dispose of contents/container in accordance with local/regional/national/international regulations.

· **Classification system:**
· **NFPA ratings (scale 0 - 4)**



Health = 1
Fire = 3
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**



Health = *1
Fire = 3
Reactivity = 0

· **Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

3 Composition/information on ingredients

· **Chemical characterization: Mixtures**
· **Description:** Mixture of the substances listed below with nonhazardous additions.

· **Dangerous components:**		
67-56-1	methanol	99.368%
103-65-1	propylbenzene	0.632%

(Contd. on page 3)

Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 2)

4 First-aid measures

· **Description of first aid measures**
· **General information:**
Immediately remove any clothing soiled by the product.
Remove breathing apparatus only after contaminated clothing have been completely removed.
In case of irregular breathing or respiratory arrest provide artificial respiration.
· **After inhalation:**
Supply fresh air or oxygen; call for doctor.
In case of unconsciousness place patient stably in side position for transportation.
· **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
· **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
· **After swallowing:** If symptoms persist consult doctor.
· **Information for doctor:**
· **Most important symptoms and effects, both acute and delayed** No further relevant information available.
· **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:**
CO2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
· **For safety reasons unsuitable extinguishing agents:** Water with full jet
· **Special hazards arising from the substance or mixture**
During heating or in case of fire poisonous gases are produced.
· **Advice for firefighters**
· **Protective equipment:** Mouth respiratory protective device.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures**
Mount respiratory protective device.
Wear protective equipment. Keep unprotected persons away.
· **Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
· **Methods and material for containment and cleaning up:**
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
· **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
· **Protective Action Criteria for Chemicals**

· **PAC-1:**		
67-56-1	methanol	530 ppm
103-65-1	propylbenzene	3.7 ppm

(Contd. on page 4)

(Contd. of page 3)

· **PAC-2:**		
67-56-1	methanol	2,100 ppm
103-65-1	propylbenzene	41 ppm

· **PAC-3:**		
67-56-1	methanol	7200* ppm
103-65-1	propylbenzene	240 ppm

7 Handling and storage

· **Handling:**
· **Precautions for safe handling**
Ensure good ventilation/exhaustion at the workplace.
Open and handle receptacle with care.
Prevent formation of aerosols.
· **Information about protection against explosions and fires:**
Keep ignition sources away - Do not smoke.
Protect against electrostatic charges.
Keep respiratory protective device available.

· **Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** Store in a cool location.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:**
Keep receptacle tightly sealed.
Store in cool, dry conditions in well sealed receptacles.
· **Specific end use(s)** No further relevant information available.

8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see item 7.

· **Control parameters**

· **Components with limit values that require monitoring at the workplace:**	
67-56-1 methanol	
PEL	Long-term value: 260 mg/m³, 200 ppm
REL	Short-term value: 325 mg/m³, 250 ppm Long-term value: 260 mg/m³, 200 ppm Skin
TLV	Short-term value: 328 mg/m³, 250 ppm Long-term value: 262 mg/m³, 200 ppm Skin; BEI

· **Ingredients with biological limit values:**	
67-56-1 methanol	
BEI	15 mg/L Medium: urine Time: end of shift Parameter: Methanol (background, nonspecific)

(Contd. on page 5)

Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 4)

· **Additional information:** The lists that were valid during the creation were used as basis.

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
· **Breathing equipment:**
When used as intended with Agilent instruments, the use of the product under normal laboratory conditions and with standard practices does not result in significant airborne exposures and therefore respiratory protection is not needed.
Under an emergency condition where a respirator is deemed necessary, use a NIOSH or equivalent approved device/equipment with appropriate organic or acid gas cartridge.
· **Protection of hands:**
Although not recommended for constant contact with the chemicals or for clean-up, nitrile gloves 11-13 mil thickness are recommended for normal use. The breakthrough time is 1 hr. For cleaning a spill where there is direct contact of the chemical, butyl rubber gloves are recommended 12-15 mil thickness with breakthrough times exceeding 4 hrs. Supplier recommendations should be followed.
· **Material of gloves**
For normal use: nitrile rubber, 11-13 mil thickness
For direct contact with the chemical: butyl rubber, 12-15 mil thickness
· **Penetration time of glove material**
For normal use: nitrile rubber: 1 hour
For direct contact with the chemical: butyl rubber: >4 hours
· **Eye protection:**



Tightly sealed goggles

9 Physical and chemical properties

· **Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Fluid
Color:	Colorless
· **Odor:**	Alcohol-like
· **Odor threshold:**	Not determined.
· **pH-value:**	Not determined.
· **Change in condition**	
Melting point/Melting range:	-98 °C (-144.4 °F)
Boiling point/Boiling range:	64.7 °C (148.5 °F)
· **Flash point:**	9 °C (48.2 °F)
· **Flammability (solid, gaseous):**	Not applicable.

(Contd. on page 6)

(Contd. of page 5)

· **Ignition temperature:**	455 °C (851 °F)
· **Decomposition temperature:**	Not determined.
· **Auto igniting:**	Product is not selfigniting.
· **Danger of explosion:**	Product is not explosive. However, formation of explosive air/vapor mixtures are possible.
· **Explosion limits:**	
Lower:	5.5 Vol %
Upper:	44 Vol %
· **Vapor pressure at 20 °C (68 °F):**	100 hPa (75 mm Hg)
· **Density at 20 °C (68 °F):**	0.80063 g/cm³ (6.68126 lbs/gal)
· **Relative density**	Not determined.
· **Vapor density**	Not determined.
· **Evaporation rate**	Not determined.
· **Solubility in / Miscibility with**	
Water:	Not miscible or difficult to mix.
· **Partition coefficient (n-octanol/water):**	Not determined.
· **Viscosity:**	
Dynamic:	Not determined.
Kinematic:	Not determined.
· **Solvent content:**	
Organic solvents:	100.0 %
VOC content:	100.00 % 800.6 g/l / 6.68 lb/gal
Solids content:	0.0 %
· **Other information**	No further relevant information available.

10 Stability and reactivity

· **Reactivity** No further relevant information available.
· **Chemical stability**
· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
· **Possibility of hazardous reactions** No dangerous reactions known.
· **Conditions to avoid** No further relevant information available.
· **Incompatible materials:** No further relevant information available.
· **Hazardous decomposition products:** No dangerous decomposition products known.

11 Toxicological information

· **Information on toxicological effects**
· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**		
ATE (Acute Toxicity Estimate)		
Inhalative	LC50/4 h	3.02 mg/L

(Contd. on page 7)

(Contd. of page 6)

67-56-1 methanol		
Oral	LD50	5,628 mg/kg (rat)
Dermal	LD50	15,800 mg/kg (rabbit)
103-65-1 propylbenzene		
Oral	LD50	6,040 mg/kg (rat)

· **Primary irritant effect:**
· **on the skin:** No irritant effect.
· **on the eye:** No irritating effect.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**
The product shows the following dangers according to internally approved calculation methods for preparations:
Toxic

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**
None of the ingredients is listed.

· **NTP (National Toxicology Program)**
None of the ingredients is listed.

· **OSHA-Ca (Occupational Safety & Health Administration)**
None of the ingredients is listed.

12 Ecological information

· **Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **Persistence and degradability** No further relevant information available.
· **Behavior in environmental systems:**
· **Bioaccumulative potential** No further relevant information available.
· **Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Water hazard class 1 (Self-assessment): slightly hazardous for water
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

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Safety Data Sheet
acc. to OSHA HCS

Trade name: n-Propylbenzene Standard (1X1 mL)

(Contd. of page 7)

· **Uncleaned packagings:**
· **Recommendation:** Disposal must be made according to official regulations.

*
14 Transport information

· **Not Regulated, De minimus Quantities**	-
· **UN-Number**	
· **DOT, IMDG, IATA**	UN1230
· **UN proper shipping name**	
· **DOT**	Methanol solution
· **IMDG, IATA**	METHANOL solution
· **Transport hazard class(es)**	
· **DOT**	
· **Class**	3 Flammable liquids
· **Label**	3, 6.1
· **IMDG**	
· **Class**	3 Flammable liquids
· **Label**	3/6.1
· **IATA**	
· **Class**	3 Flammable liquids
· **Label**	3 (6.1)
· **Packing group**	
· **DOT, IMDG, IATA**	II
· **Environmental hazards:**	Not applicable.
· **Special precautions for user**	Warning: Flammable liquids
· **Danger code (Kemler):**	336
· **EMS Number:**	F-E,S-D
· **Stowage Category**	B
· **Stowage Code**	SW2 Clear of living quarters.
· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.

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Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 8)

· **Transport/Additional information:**

· **DOT**

· **Quantity limitations**	On passenger aircraft/rail: 1 L On cargo aircraft only: 60 L

· **IMDG**

· **Limited quantities (LQ)**	1L
· **Excepted quantities (EQ)**	Code: E2 Maximum net quantity per inner packaging: 30 ml Maximum net quantity per outer packaging: 500 ml
· **UN "Model Regulation":**	UN 1230 METHANOL SOLUTION, 3 (6.1), II

15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**

· **Sara**

· **Section 355 (extremely hazardous substances):**

None of the ingredients is listed.

· **Section 313 (Specific toxic chemical listings):**

67-56-1	methanol

· **TSCA (Toxic Substances Control Act):**

All ingredients are listed.

· **Proposition 65**

· **Chemicals known to cause cancer:**

None of the ingredients is listed.

· **Chemicals known to cause reproductive toxicity for females:**

None of the ingredients is listed.

· **Chemicals known to cause reproductive toxicity for males:**

None of the ingredients is listed.

· **Chemicals known to cause developmental toxicity:**

67-56-1	methanol

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**

None of the ingredients is listed.

· **TLV (Threshold Limit Value established by ACGIH)**

None of the ingredients is listed.

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**

None of the ingredients is listed.

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

(Contd. on page 10)

Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 9)

16 Other information

The information contained in this document is based on Agilent's state of knowledge at the time of preparation. No warranty as to its accurateness, completeness or suitability for a particular purpose is expressed or implied.

· **Department issuing SDS:** Document Control / Regulatory
· **Contact:** regulatory@ultrasci.com
· **Date of preparation / last revision** 03/28/2019 / 2
· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
VOC: Volatile Organic Compounds (USA, EU)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety & Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
BEI: Biological Exposure Limit
Flam. Liq. 2: Flammable liquids – Category 2
Acute Tox. 3: Acute toxicity – Category 3
Carc. 2: Carcinogenicity – Category 2
STOT SE 1: Specific target organ toxicity (single exposure) – Category 1
· *** Data compared to the previous version altered.**

SAFETY DATA SHEET

Version 4.10
Revision Date 06/02/2016
Print Date 10/31/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 2-Chlorotoluene

Product Number : 111910
Brand : Aldrich
Index-No. : 602-040-00-X

CAS-No. : 95-49-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 3), H226
Acute toxicity, Inhalation (Category 4), H332
Reproductive toxicity (Category 2), H361
Acute aquatic toxicity (Category 2), H401
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H226 Flammable liquid and vapour.
H332 Harmful if inhaled.
H361 Suspected of damaging fertility or the unborn child.
H411 Toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.

P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	C_7H_7Cl
Molecular weight	:	126.58 g/mol
CAS-No.	:	95-49-8
EC-No.	:	202-424-3
Index-No.	:	602-040-00-X

Hazardous components

Component	Classification	Concentration
2-Chlorotoluene		
	Flam. Liq. 3; Acute Tox. 4; Repr. 2; Aquatic Acute 2; Aquatic Chronic 2; H226, H332, H361, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
2-Chlorotoluene	95-49-8	TWA	50.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation Eye irritation		

		Skin irritation		
		TWA	50.000000 ppm 250.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	75.000000 ppm 375.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		PEL	50 ppm 250 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -36 °C (-33 °F) - lit.
f)	Initial boiling point and boiling range	157 - 159 °C (315 - 318 °F) - lit.
g)	Flash point	42.0 °C (107.6 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	13.3 hPa (10.0 mmHg) at 43.0 °C (109.4 °F)
l)	Vapour density	No data available
m)	Relative density	1.083 g/cm3 at 25 °C (77 °F)
n)	Water solubility	0.047 g/l at 20 °C (68 °F) - slightly soluble
o)	Partition coefficient: n-octanol/water	log Pow: 3.42
p)	Auto-ignition temperature	> 500 °C (> 932 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

Heat, flames and sparks.

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male - 3,227 mg/kg

Inhalation: No data available

LD50 Dermal - Rat - male and female - > 1,080 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitisation
Maximisation Test - Guinea pig
Result: Did not cause sensitisation on laboratory animals.
(OECD Test Guideline 406)

Germ cell mutagenicity
In vitro mammalian cell gene mutation test
lymphocyte
Result: negative

Carcinogenicity

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: XS9000000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Kidney -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oryzias latipes - 7.7 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 20 mg/l - 24 h
Toxicity to algae	EC50 - Selenastrum capricornutum (green algae) - 7.8 mg/l - 72 h (OECD Test Guideline 201)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2238 Class: 3 Packing group: III
Proper shipping name: Chlorotoluenes
Reportable Quantity (RQ):

Poison Inhalation Hazard: No

IMDG
UN number: 2238 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: CHLOROTOLUENES

IATA
UN number: 2238 Class: 3 Packing group: III
Proper shipping name: Chlorotoluenes

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
2-Chlorotoluene	95-49-8	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
2-Chlorotoluene	95-49-8	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
2-Chlorotoluene	95-49-8	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.
H332	Harmful if inhaled.
H361	Suspected of damaging fertility or the unborn child.
H401	Toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.
Repr.	Reproductive toxicity

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	2
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	2
Reactivity Hazard:	0

Further information
Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.10 Revision Date: 06/02/2016 Print Date: 10/31/2016

SAFETY DATA SHEET

Version 4.7
Revision Date 05/27/2015
Print Date 04/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : *o*-Cresol

Product Number : C85700
Brand : Sigma-Aldrich
Index-No. : 604-004-00-9

CAS-No. : 95-48-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Dermal (Category 3), H311
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Acute aquatic toxicity (Category 2), H401
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H301 + H311 Toxic if swallowed or in contact with skin
H314 Causes severe skin burns and eye damage.
H318 Causes serious eye damage.
H411 Toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P260 Do not breathe dust or mist.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.

P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician. Rinse mouth.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	2-Methylphenol
Formula	:	C_7H_8O
Molecular weight	:	108.14 g/mol
CAS-No.	:	95-48-7
EC-No.	:	202-423-8
Index-No.	:	604-004-00-9

Hazardous components

Component	Classification	Concentration
o-Cresol		
	Acute Tox. 3; Skin Corr. 1B; Eye Dam. 1; Aquatic Acute 2; Aquatic Chronic 2; H301 + H311, H314, H318, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Air and light sensitive. Keep in a dry place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
o-Cresol	95-48-7	TWA	5.000000 ppm 22.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Remarks	Skin contact does contribute to exposure.		

		TWA	5.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Eye, skin, & Upper Respiratory Tract irritation Adopted values or notations enclosed are those for which changes are proposed in the NIC 2010 Revision or addition to the notice of intended changes See Notice of Intended Changes (NIC) Danger of cutaneous absorption		
		TWA	2.300000 ppm 10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	20.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Not classifiable as a human carcinogen Danger of cutaneous absorption		

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 480 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm
Break through time: 30 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: white
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	4.5 at 25.00000 g/l
e)	Melting point/freezing point	Melting point/range: 29 - 31 °C (84 - 88 °F) - lit.
f)	Initial boiling point and boiling range	191 °C (376 °F) - lit.
g)	Flash point	81.0 °C (177.8 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 58 %(V) Lower explosion limit: 1.3 %(V)
k)	Vapour pressure	3.1 hPa (2.3 mmHg) at 60.0 °C (140.0 °F) 1.3 hPa (1.0 mmHg) at 38.2 °C (100.8 °F) 0.4 hPa (0.3 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.05 g/cm3 at 20.00 °C (68.00 °F)
n)	Water solubility	25 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	599.0 °C (1,110.2 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Oxidizing agents

10.6 Hazardous decomposition products

Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 121.0 mg/kg
Remarks: Behavioral:Convulsions or effect on seizure threshold. Lungs, Thorax, or Respiration:Dyspnea. Gastrointestinal:Ulceration or bleeding from stomach.

LC50 Inhalation - Rat - 1 h - > 1,220 mg/m3
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Lacrimation. Behavioral:Somnolence (general depressed activity).

LD50 Dermal - Rabbit - 890.0 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Severe skin irritation - 24 h
(Draize Test)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Severe eye irritation
(Draize Test)

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: GO6300000

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Central nervous system depression, Diarrhoea, Gastrointestinal disturbance

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Leuciscus idus (Golden orfe) - 10.00 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 15.8 mg/l - 48 h
Toxicity to algae	EC50 - SELENASTRUM - 100.00 mg/l - 72 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life with long lasting effects.

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3455 Class: 6.1 (8) Packing group: II
Proper shipping name: Cresols, solid
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 3455 Class: 6.1 (8) Packing group: II EMS-No: F-A, S-B
Proper shipping name: CRESOLS, SOLID

IATA
UN number: 3455 Class: 6.1 (8) Packing group: II
Proper shipping name: Cresols, solid

15. REGULATORY INFORMATION

SARA 302 Components
The following components are subject to reporting levels established by SARA Title III, Section 302:

	CAS-No.	Revision Date
o-Cresol	95-48-7	2007-07-01

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
o-Cresol	95-48-7	2007-07-01

Massachusetts Right To Know Components

	CAS-No.	Revision Date
o-Cresol	95-48-7	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
o-Cresol	95-48-7	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
o-Cresol	95-48-7	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Eye Dam.	Serious eye damage
H301	Toxic if swallowed.
H301 + H311	Toxic if swallowed or in contact with skin
H311	Toxic in contact with skin.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	3
Fire Hazard:	2
Reactivity Hazard:	0

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.7 Revision Date: 05/27/2015 Print Date: 04/01/2016

SAFETY DATA SHEET

Version 5.5
Revision Date 06/02/2016
Print Date 06/21/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : *o*-Xylene

Product Number : 95660
Brand : Sigma-Aldrich
Index-No. : 601-022-00-9

CAS-No. : 95-47-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 3), H226
Acute toxicity, Inhalation (Category 4), H332
Acute toxicity, Dermal (Category 4), H312
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Aspiration hazard (Category 1), H304
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H312 + H332	Harmful in contact with skin or if inhaled
H315	Causes skin irritation.
H319	Causes serious eye irritation.

H335	May cause respiratory irritation.
H412	Harmful to aquatic life with long lasting effects.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	1,2-Dimethylbenzene
Formula	:	C_8H_{10}
Molecular weight	:	106.17 g/mol
CAS-No.	:	95-47-6
EC-No.	:	202-422-2
Index-No.	:	601-022-00-9

Hazardous components

Component	Classification	Concentration
o-Xylene		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; Asp. Tox. 1; Aquatic Acute 3; Aquatic Chronic 3; H226, H304, H312 + H332, H315, H319, H335, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
o-Xylene	95-47-6	TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	100.000000 ppm 435.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	150.000000 ppm 655.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment		

		Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
o-Xylene	95-47-6	Methylhippuric acids	1,500.0000 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
		Methylhippuric acids	1.5g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber

Minimum layer thickness: 0.4 mm
Break through time: 30 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -26 - -23 °C (-15 - -9 °F) - lit.
f)	Initial boiling point and boiling range	143 - 145 °C (289 - 293 °F) - lit.
g)	Flash point	31.0 °C (87.8 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 6.7 %(V) Lower explosion limit: 0.9 %(V)
k)	Vapour pressure	21.3 hPa (16.0 mmHg) at 37.7 °C (99.9 °F)
l)	Vapour density	No data available
m)	Relative density	0.879 g/mL at 20 °C (68 °F)
n)	Water solubility	0.1705 g/l at 25 °C (77 °F) - partly soluble
o)	Partition coefficient: n-octanol/water	log Pow: 3.12 at 20 °C (68 °F)
p)	Auto-ignition temperature	464.0 °C (867.2 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available

s) Explosive properties No data available

t) Oxidizing properties No data available

9.2 Other safety information

Surface tension 29.8 mN/m at 25.0 °C (77.0 °F)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

LC50 Inhalation - Rat - male - 6 h - 18,800 mg/m3

Dermal: No data available

LD50 Intraperitoneal - Mouse - 1,364 mg/kg

Skin corrosion/irritation
Skin - Rabbit
Result: Irritating to skin. - 24 h

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
- Mouse
Result: Does not cause skin sensitisation.
(OECD Test Guideline 429)

Germ cell mutagenicity
Ames test
Salmonella typhimurium
Result: negative

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (o-Xylene)

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
May be fatal if swallowed and enters airways.

Additional Information
RTECS: ZE2450000

narcosis, Lung irritation, chest pain, pulmonary edema, Central nervous system depression, Dermatitis, Gastrointestinal disturbance, Liver injury may occur., Kidney injury may occur., Blood disorders

Nerves. -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Lepomis macrochirus (Bluegill) - 16.10 mg/l - 96 h

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 69.67 % - Not readily biodegradable. (OECD Test Guideline 301F) Remarks: The 10 day time window criterion is not fulfilled.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1307 Class: 3 Packing group: III
Proper shipping name: Xylenes
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1307 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: XYLENES

IATA
UN number: 1307 Class: 3 Packing group: III
Proper shipping name: Xylenes

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
o-Xylene	95-47-6	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
o-Xylene	95-47-6	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
o-Xylene	95-47-6	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
o-Xylene	95-47-6	2007-07-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Asp. Tox.	Aspiration hazard
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H312	Harmful in contact with skin.

H312 + H332	Harmful in contact with skin or if inhaled
H315	Causes skin irritation.
H319	Causes serious eye irritation.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.5 Revision Date: 06/02/2016 Print Date: 06/21/2016

SAFETY DATA SHEET

Version 4.10
Revision Date 11/12/2015
Print Date 02/07/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : *p*-Cresol

Product Number : W233706
Brand : Aldrich
Index-No. : 604-004-00-9

CAS-No. : 106-44-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Dermal (Category 3), H311
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Acute aquatic toxicity (Category 2), H401
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H301 + H311 Toxic if swallowed or in contact with skin
H314 Causes severe skin burns and eye damage.
H411 Toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P260 Do not breathe dust or mist.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.

P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/ physician.
P322	Specific measures (see supplemental first aid instructions on this label).
P361	Remove/Take off immediately all contaminated clothing.
P363	Wash contaminated clothing before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : 4-Methylphenol

Formula : C_7H_8O

Molecular weight : 108.14 g/mol

CAS-No. : 106-44-5

EC-No. : 203-398-6

Index-No. : 604-004-00-9

Hazardous components

Component	Classification	Concentration
p-Cresol		
	Acute Tox. 3; Skin Corr. 1B; Eye Dam. 1; Aquatic Acute 2; Aquatic Chronic 2; H301 + H311, H314, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

hygroscopic Air and light sensitive. Handle and store under inert gas.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
p-Cresol	106-44-5	TWA	2.3 ppm 10 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5 ppm 22 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Remarks	Skin designation The value in mg/m3 is approximate.		

		TWA	20 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Not classifiable as a human carcinogen Danger of cutaneous absorption		

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 480 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm
Break through time: 30 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: crystalline Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing	Melting point/range: 31 - 37 °C (88 - 99 °F)

	point	Melting point/range: 32 - 34 °C (90 - 93 °F) - lit.
f)	Initial boiling point and boiling range	202 °C (396 °F) - lit.
g)	Flash point	85.0 °C (185.0 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Lower explosion limit: 1.1 %(V)
k)	Vapour pressure	1.3 hPa (1.0 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.034 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 1.94
p)	Auto-ignition temperature	559.0 °C (1,038.2 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Oxidizing agents, Bases

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 207.0 mg/kg
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Other changes. Behavioral:Convulsions or effect on seizure threshold. Gastrointestinal:Ulceration or bleeding from stomach.

LC50 Inhalation - Rat - 1 h - > 710 mg/m3

LD50 Dermal - Rabbit - 301.0 mg/kg
Remarks: Behavioral:Tremor. Gastrointestinal:Changes in structure or function of salivary glands. Kidney, Ureter, Bladder:Other changes.

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Severe skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Severe eye irritation

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: GO6475000

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, laryngitis, Dizziness, Cardiovascular effects., Muscle cramps/spasms., Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting.

Kidney -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - other fish - 16.00 - 24.00 mg/l - 24 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 7.9 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 1.4 mg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Does not bioaccumulate.

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life.

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3455 Class: 6.1 (8) Packing group: II
Proper shipping name: Cresols, solid
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 3455 Class: 6.1 (8) Packing group: II EMS-No: F-A, S-B
Proper shipping name: CRESOLS, SOLID

IATA
UN number: 3455 Class: 6.1 (8) Packing group: II
Proper shipping name: Cresols, solid

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
p-Cresol	106-44-5	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
p-Cresol	106-44-5	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
p-Cresol	106-44-5	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
p-Cresol	106-44-5	2007-07-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Eye Dam.	Serious eye damage
H301	Toxic if swallowed.
H301 + H311	Toxic if swallowed or in contact with skin
H311	Toxic in contact with skin.
H314	Causes severe skin burns and eye damage.

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	3
Fire Hazard:	2
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.10 Revision Date: 11/12/2015 Print Date: 02/07/2016

SAFETY DATA SHEET

Version 4.2
Revision Date 07/09/2014
Print Date 04/20/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 1,4-Diethylbenzene

Product Number : D91004
Brand : Aldrich

CAS-No. : 105-05-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 3), H226
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H226 Flammable liquid and vapour.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.

P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312	Call a POISON CENTER or doctor/ physician if you feel unwell.
P321	Specific treatment (see supplemental first aid instructions on this label).
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_{10}H_{14}$
Molecular Weight	:	134.22 g/mol
CAS-No.	:	105-05-5
EC-No.	:	203-265-2

Hazardous components

Component	Classification	Concentration
1,4-Diethylbenzene		
	Flam. Liq. 3; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; H226, H315, H319, H335	-

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 30 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
impervious clothing, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: clear, liquid Colour: colourless
b)	Odour	no data available
c)	Odour Threshold	no data available
d)	pH	no data available
e)	Melting point/freezing point	Melting point/range: -43 °C (-45 °F) - lit.
f)	Initial boiling point and boiling range	184 °C (363 °F) - lit.
g)	Flash point	55 °C (131 °F) - closed cup
h)	Evapouration rate	no data available
i)	Flammability (solid, gas)	no data available
j)	Upper/lower flammability or	no data available

	explosive limits	
k)	Vapour pressure	no data available
l)	Vapour density	4.63 - (Air = 1.0)
m)	Relative density	0.862 g/cm3 at 25 °C (77 °F)
n)	Water solubility	no data available
o)	Partition coefficient: n-octanol/water	no data available
p)	Auto-ignition temperature	no data available
q)	Decomposition temperature	no data available
r)	Viscosity	no data available
s)	Explosive properties	no data available
t)	Oxidizing properties	no data available

9.2 Other safety information

Relative vapour density 4.63 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
no data available

Dermal: no data available

no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

no data available

Specific target organ toxicity - single exposure
Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity
no data available

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 2049 Class: 3 Packing group: III
Proper shipping name: Diethylbenzene
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 2049 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: DIETHYLBENZENE
Marine pollutant: No

IATA
UN number: 2049 Class: 3 Packing group: III
Proper shipping name: Diethylbenzene

15. REGULATORY INFORMATION

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,4-Diethylbenzene	105-05-5	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,4-Diethylbenzene	105-05-5	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
1,4-Diethylbenzene	105-05-5	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
Skin Irrit.	Skin irritation
STOT SE	Specific target organ toxicity - single exposure

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	2
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	2

Reactivity Hazard: 0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.2 Revision Date: 07/09/2014 Print Date: 04/20/2016

SAFETY DATA SHEET

Version 4.9
Revision Date 12/29/2015
Print Date 02/22/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Pentachlorophenol

Product Number : P2604
Brand : Aldrich
Index-No. : 604-002-00-8

CAS-No. : 87-86-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 2), H330
Acute toxicity, Dermal (Category 3), H311
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Carcinogenicity (Category 2), H351
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H301 + H311 Toxic if swallowed or in contact with skin
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H330 Fatal if inhaled.
H335 May cause respiratory irritation.

H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284	Wear respiratory protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician. Rinse mouth.
P302 + P352 + P312	IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or doctor/ physician if you feel unwell.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	C_6HCl_5O
Molecular weight	:	266.34 g/mol
CAS-No.	:	87-86-5
EC-No.	:	201-778-6
Index-No.	:	604-002-00-8

Hazardous components

Component	Classification	Concentration
Pentachlorophenol		
	Acute Tox. 3; Acute Tox. 2; Acute Tox. 3; Skin Irrit. 2; Eye Irrit. 2A; Carc. 2; STOT SE 3; Aquatic Acute 1; Aquatic Chronic 2; H301 + H311, H315, H319, H330, H335, H351, H400, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Pentachlorophenol	87-86-5	TWA	0.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Cardiac impairment Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	0.500000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		
		TWA	0.500000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		TWA	0.5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Cardiac impairment 2015 Adoption Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		STEL	1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Cardiac impairment 2015 Adoption Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Pentachlorophenol	87-86-5	pentachlorophenol	2.0000 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Prior to last shift of workweek			
		Free PCP	5.0000 mg/l	In plasma	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			
		pentachlorophenol		Urine	ACGIH - Biological Exposure Indices (BEI)

		Prior to last shift of workweek

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 120 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: crystalline Colour: light red
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 165 - 180 °C (329 - 356 °F)
f)	Initial boiling point and boiling range	310 °C (590 °F)
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower	No data available

	flammability or explosive limits	
k)	Vapour pressure	53.3 hPa (40.0 mmHg) at 211.2 °C (412.2 °F)
l)	Vapour density	No data available
m)	Relative density	1.978 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 5.12
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Strong bases

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 27 mg/kg
Remarks: Vascular:BP elevation not charactertized in autonomic section. Endocrine:Hyperglycemia. Nutritional and Gross Metabolic:Changes in:Body temperature increase.

LC50 Inhalation - Rat - 355 mg/m3
Remarks: Behavioral:Excitement. Behavioral:Muscle contraction or spasticity. Lungs, Thorax, or Respiration:Dyspnea.

LD50 Dermal - Rat - 96.0 mg/kg
Remarks: Behavioral:Excitement. Behavioral:Muscle contraction or spasticity. Lungs, Thorax, or Respiration:Dyspnea.

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Open irritation test - 24.00 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation - 24.00 h

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

The evidence for carcinogenicity of pentachlorophenol (PCP) is based on assays that utilized less than pure PCP. Contaminants of PCP include: tri- or tetra- chlorophenol, hexachlorobenzene, polychlorinated dibenzo-p-dioxins, or polychlorinated dibenzofurans. Indications are that positive evidence for carcinogenicity is from the contaminant(s) and not the PCP. This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Pentachlorophenol)
NTP:	Reasonably anticipated to be a human carcinogen (Pentachlorophenol)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Specific target organ toxicity - single exposure
May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

Convulsions

Kidney -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Cyprinodon variegatus (sheepshead minnow) - 0.16 - 0.5 mg/l - 96.0 h
	LC50 - Carassius auratus (goldfish) - 0.16 - 0.38 mg/l - 96.0 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.075 mg/l - 96.0 h
	NOEC - other fish - 0.01 mg/l - 24.0 h
	LOEC - other fish - 0.1 mg/l - 24.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.30 - 1.30 mg/l - 48 h
Toxicity to algae	EC50 - No information available. - 0.36 mg/l - 10 d
	EC50 - Chlorella vulgaris (Fresh water algae) - 10.30 mg/l - 96 h
	Growth inhibition EC50 - Scenedesmus quadricauda (Green algae) - 0.08 mg/l - 96 h

12.2 Persistence and degradability

Biodegradability Result: 99 % - Biodegradable

12.3 Bioaccumulative potential

Bioaccumulation Oncorhynchus mykiss (rainbow trout) - 144 h
- 0.0912 mg/l

Bioconcentration factor (BCF): 482

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 3155 Class: 6.1 Packing group: II
Proper shipping name: Pentachlorophenol
Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

IMDG

UN number: 3155 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: PENTACHLOROPHENOL
Marine pollutant: yes

IATA

UN number: 3155 Class: 6.1 Packing group: II
Proper shipping name: Pentachlorophenol

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Pentachlorophenol	87-86-5	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Pentachlorophenol	87-86-5	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Pentachlorophenol	87-86-5	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Pentachlorophenol	87-86-5	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
H301	Toxic if swallowed.
H301 + H311	Toxic if swallowed or in contact with skin
H311	Toxic in contact with skin.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H330	Fatal if inhaled.
H335	May cause respiratory irritation.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	1

NFPA Rating

Health hazard:	4
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.9 Revision Date: 12/29/2015 Print Date: 02/22/2016

SAFETY DATA SHEET

Version 4.5
Revision Date 07/08/2014
Print Date 10/12/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 4-Ethyltoluene

Product Number : E49800
Brand : Aldrich

CAS-No. : 622-96-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 3), H226
Aspiration hazard (Category 1), H304

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H226 Flammable liquid and vapour.
H304 May be fatal if swallowed and enters airways.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.

P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P331	Do NOT induce vomiting.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : C_9H_{12}
Molecular Weight : 120.19 g/mol
CAS-No. : 622-96-8
EC-No. : 210-761-2

Hazardous components

Component	Classification	Concentration
4-Ethyltoluene		
	Flam. Liq. 3; Asp. Tox. 1; H226, H304	-

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm

Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: clear, liquid Colour: light yellow
b)	Odour	no data available
c)	Odour Threshold	no data available
d)	pH	no data available
e)	Melting point/freezing point	no data available
f)	Initial boiling point and boiling range	162 °C (324 °F) - lit.
g)	Flash point	43 °C (109 °F) - closed cup
h)	Evapouration rate	no data available
i)	Flammability (solid, gas)	no data available
j)	Upper/lower flammability or explosive limits	no data available
k)	Vapour pressure	no data available
l)	Vapour density	no data available
m)	Relative density	0.861 g/cm3 at 25 °C (77 °F)
n)	Water solubility	no data available
o)	Partition coefficient: n-octanol/water	no data available
p)	Auto-ignition temperature	no data available
q)	Decomposition temperature	no data available
r)	Viscosity	no data available
s)	Explosive properties	no data available

t) Oxidizing properties no data available

9.2 Other safety information
no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - rat - 4,850 mg/kg
Remarks: Behavioral:Convulsions or effect on seizure threshold. Behavioral:Ataxia.

Inhalation: no data available

Dermal: no data available

no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity

mouse
Sister chromatid exchange

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Reproductive toxicity - rat - Oral
Maternal Effects: Other effects. Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
The substance or mixture is known to cause human aspiration toxicity hazards or has to be regarded as if it causes a human aspiration toxicity hazard.

Additional Information
RTECS: XT2550000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
no data available

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3295 Class: 3 Packing group: III
Proper shipping name: Hydrocarbons, liquid, n.o.s.
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 3295 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: HYDROCARBONS, LIQUID, N.O.S.
Marine pollutant: No

IATA

UN number: 3295 Class: 3 Packing group: III
Proper shipping name: Hydrocarbons, liquid, n.o.s.

15. REGULATORY INFORMATION

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
4-Ethyltoluene	622-96-8	

New Jersey Right To Know Components

	CAS-No.	Revision Date
4-Ethyltoluene	622-96-8	

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Asp. Tox.	Aspiration hazard
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	
Flammability:	2
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	2
Reactivity Hazard:	0

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

SAFETY DATA SHEET

Version 6.4
Revision Date 04/18/2021
Print Date 06/19/2021

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Perfluorooctanoic acid

Product Number : 171468
Brand : Aldrich
CAS-No. : 335-67-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 1B), H360
Effects on or via lactation, H362
Specific target organ toxicity - repeated exposure (Category 1), Liver, H372

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



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Signal word	Danger
Hazard statement(s)	
H302	Harmful if swallowed.
H314	Causes severe skin burns and eye damage.
H351	Suspected of causing cancer.
H360	May damage fertility or the unborn child.
H362	May cause harm to breast-fed children.
H372	Causes damage to organs (Liver) through prolonged or repeated exposure.
Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P263	Avoid contact during pregnancy/ while nursing.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P363	Wash contaminated clothing before reuse.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	Pentadecafluorooctanoic acid Perfluorocaprylic acid Perfluorooctanoic acid
Formula	:	$C_8HF_{15}O_2$
Molecular weight	:	414.07 g/mol
CAS-No.	:	335-67-1
EC-No.	:	206-397-9

Component	Classification	Concentration
pentadecafluorooctanoic acid		
	Acute Tox. 4; Skin Corr.	<= 100 %

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	1B; Eye Dam. 1; Carc. 2; Repr. 1B; Lact. ; STOT RE 1; H302, H314, H318, H351, H360, H362, H372	

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most), avoid vomiting (risk of perforation). Call a physician immediately. Do not attempt to neutralise.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Hydrogen fluoride
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

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5.4 Further information

Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.
Storage class (TRGS 510): 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

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8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Acid-resistant protective clothing

Respiratory protection
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: flakes Color: colorless

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b)	Odor	stinging
c)	Odor Threshold	No data available
d)	pH	2.6 at 1 g/l at 20 °C (68 °F)
e)	Melting point/freezing point	Melting point/range: 55 - 56 °C (131 - 133 °F) - lit.
f)	Initial boiling point and boiling range	189 °C 372 °F at 981 hPa - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	0.69 hPa at 25 °C (77 °F)
l)	Vapor density	No data available
m)	Relative density	No data available
n)	Water solubility	3.4 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 6.30 - Potential bioaccumulation, (Lit.)
p)	Autoignition temperature	No data available
q)	Decomposition temperature	> 300 °C (> 572 °F) -
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Violent reactions possible with:
Strong oxidizing agents
Strong acids
Bases

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10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Acute toxicity estimate Oral - 500.1 mg/kg
(Expert judgment)

Acute toxicity estimate Inhalation - 4 h - 11.1 mg/l
(Expert judgment)

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
Causes serious eye damage.

Respiratory or skin sensitization

Germ cell mutagenicity
No data available

No data available
No data available

Carcinogenicity
Suspected of causing cancer.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (pentadecafluorooctanoic acid)

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
May damage the unborn child.
Studies indicating a hazard to babies during the lactation period

Specific target organ toxicity - single exposure

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Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure. - Liver

Aspiration hazard

11.2 Additional Information

RTECS: RH0781000

Cough, Shortness of breath, Headache, Nausea, Vomiting
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After absorption:

gastric pain
Nausea
Vomiting
Drowsiness
somnolence

Handle in accordance with good industrial hygiene and safety practice.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

No data available

Toxicity to daphnia and other aquatic invertebrates	Remarks: No data available (pentadecafluorooctanoic acid)
Toxicity to algae	Remarks: No data available (pentadecafluorooctanoic acid)

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

Discharge into the environment must be avoided.

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 3261 Class: 8 Packing group: III
Proper shipping name: Corrosive solid, acidic, organic, n.o.s. (pentadecafluorooctanoic acid)
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 3261 Class: 8 Packing group: III EMS-No: F-A, S-B
Proper shipping name: CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S. (pentadecafluorooctanoic acid)

IATA
UN number: 3261 Class: 8 Packing group: III
Proper shipping name: Corrosive solid, acidic, organic, n.o.s. (pentadecafluorooctanoic acid)

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
pentadecafluorooctanoic acid	335-67-1	2018-02-01

New Jersey Right To Know Components

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SECTION 16: Other information

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.4 Revision Date: 04/18/2021 Print Date: 06/19/2021

The life science business of Merck KGaA, Darmstadt, Germany
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SAFETY DATA SHEET

Version 4.2
Revision Date 09/08/2015
Print Date 10/19/2018

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Nonafluorobutane-1-sulfonic acid

Product Number : 562629
Brand : Aldrich

CAS-No. : 375-73-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H302 Harmful if swallowed.
H314 Causes severe skin burns and eye damage.

Precautionary statement(s)
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.
P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353 IF ON SKIN (or hair): Remove/ Take off immediately all contaminated

	clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/ physician.
P321	Specific treatment (see supplemental first aid instructions on this label).
P363	Wash contaminated clothing before reuse.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS
Reacts violently with water.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_4HF_9O_3S$
Molecular weight	:	300.10 g/mol
CAS-No.	:	375-73-5
EC-No.	:	206-793-1

Hazardous components

Component	Classification	Concentration
1,1,2,2,3,3,4,4,4-Nonafluorobutane-1-sulphonic acid		
	Acute Tox. 4; Skin Corr. 1B; Eye Dam. 1; H302, H314	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Dry powder

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Sulphur oxides, Hydrogen fluoride

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Never allow product to get in contact with water during storage.

Recommended storage temperature 2 - 8 °C

Handle and store under inert gas.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Complete suit protecting against chemicals, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	112 - 114 °C (234 - 237 °F) at 19 hPa (14 mmHg) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.811 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Reacts violently with water.

10.4 Conditions to avoid
Do not allow water to enter container because of violent reaction.
Exposure to moisture

10.5 Incompatible materials
Strong oxidizing agentsStrong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 430 mg/kg
Remarks: Behavioral:Somnolence (general depressed activity). Skin and Appendages: Other: Hair. Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: EK5930000

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3265 Class: 8 Packing group: II
Proper shipping name: Corrosive liquid, acidic, organic, n.o.s. (1,1,2,2,3,3,4,4,4-Nonafluorobutane-1-sulphonic acid)

Poison Inhalation Hazard: No

IMDG
UN number: 3265 Class: 8 Packing group: II EMS-No: F-A, S-B
Proper shipping name: CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (1,1,2,2,3,3,4,4,4-Nonafluorobutane-1-sulphonic acid)

IATA
UN number: 3265 Class: 8 Packing group: II
Proper shipping name: Corrosive liquid, acidic, organic, n.o.s. (1,1,2,2,3,3,4,4,4-Nonafluorobutane-1-sulphonic acid)

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

CAS-No. Revision Date

1,1,2,2,3,3,4,4,4-Nonafluorobutane-1-sulphonic acid	375-73-5

New Jersey Right To Know Components

	CAS-No.	Revision Date
1,1,2,2,3,3,4,4,4-Nonafluorobutane-1-sulphonic acid	375-73-5	

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Eye Dam.	Serious eye damage
H302	Harmful if swallowed.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
Skin Corr.	Skin corrosion

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	3
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.2 Revision Date: 09/08/2015 Print Date: 10/19/2018

SAFETY DATA SHEET

Version 4.4
Revision Date 06/18/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Perfluorodecanoic acid

Product Number : 177741
Brand : Aldrich

CAS-No. : 335-76-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H301 Toxic if swallowed.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.

Precautionary statement(s)
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear eye protection/ face protection.
P280 Wear protective gloves.

P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : Nonadecafluorodecanoic acid
Nonadecafluorocapric acid
Perfluorodecanoic acid
Perfluorocapric acid

Formula : $C_{10}HF_{19}O_2$
Molecular weight : 514.08 g/mol
CAS-No. : 335-76-2
EC-No. : 206-400-3

Hazardous components

Component	Classification	Concentration
Nonadecafluorodecanoic acid		
	Acute Tox. 3; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; H301, H315, H319, H335	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen fluoride

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: white
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 77 - 81 °C (171 - 178 °F) - lit.
f)	Initial boiling point and boiling range	218 °C (424 °F) at 987 hPa (740 mmHg) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available

n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Bases, Oxidizing agents, Reducing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 57 mg/kg
Remarks: Behavioral:Food intake (animal).

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity

Rat
DNA damage

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

Reproductive toxicity - Rat - Oral
Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Fertility: Litter size (e.g.; # fetuses per litter; measured before birth). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Reproductive toxicity - Rat - Intraperitoneal
Paternal Effects: Testes, epididymis, sperm duct.

Reproductive toxicity - Mouse - Oral
Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).
Effects on Embryo or Fetus: Fetal death.

No data available

Specific target organ toxicity - single exposure
Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: HD9900000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (Nonadecafluorodecanoic acid)
Reportable Quantity (RQ):

Poison Inhalation Hazard: No

IMDG
UN number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (Nonadecafluorodecanoic acid)

IATA
UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (Nonadecafluorodecanoic acid)

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Nonadecafluorodecanoic acid	335-76-2	

New Jersey Right To Know Components

	CAS-No.	Revision Date
Nonadecafluorodecanoic acid	335-76-2	

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Eye Irrit.	Eye irritation
H301	Toxic if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
Skin Irrit.	Skin irritation

HMIS Rating
Health hazard: 2
Chronic Health Hazard:
Flammability: 0

Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.4 Revision Date: 06/18/2015 Print Date: 05/01/2016

SAFETY DATA SHEET

Version 6.3
Revision Date 04/18/2021
Print Date 07/08/2021

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Tricosafluorododecanoic acid

Product Number : 406449
Brand : Aldrich
CAS-No. : 307-55-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Short-term (acute) aquatic hazard (Category 1), H400

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

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Hazard statement(s)

H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H400	Very toxic to aquatic life.

Precautionary statement(s)

P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	Perfluorododecanoic acid Perfluorolauric acid
Formula	:	$C_{12}HF_{23}O_2$
Molecular weight	:	614.10 g/mol
CAS-No.	:	307-55-1
EC-No.	:	206-203-2

Component	Classification	Concentration
Tricosafluorododecanoic acid		
	Acute Tox. 4; Carc. 2; Repr. 1B; Lact. ; STOT RE 1; H302, H332, H351, H360, H362, H372 M-Factor - Aquatic Acute: 10	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

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SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Consult a physician. Show this material safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen fluoride

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

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6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.**Advice on safe handling**

Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Advice on protection against fire and explosion

Provide appropriate exhaust ventilation at places where dust is formed.

Hygiene measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions

Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): 11: Combustible Solids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact

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with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator.For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: crystalline Color: white
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 105 - 108 °C (221 - 226 °F) - lit.
f)	Initial boiling point and boiling range	245 °C 473 °F at 987 hPa - lit.
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available

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s) Explosive properties No data available

t) Oxidizing properties No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Acute toxicity estimate Oral - 500.1 mg/kg
(Expert judgment)

Acute toxicity estimate Inhalation - 4 h - 11.1 mg/l
(Expert judgment)

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
Causes serious eye damage.

Respiratory or skin sensitization

Germ cell mutagenicity
No data available

No data available
No data available

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Carcinogenicity
Suspected of causing cancer.

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
May damage the unborn child.
Studies indicating a hazard to babies during the lactation period

Specific target organ toxicity - single exposure

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure. - Liver

Aspiration hazard

11.2 Additional Information
Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After absorption:

gastric pain
Nausea
Vomiting
Drowsiness
somnolence

Handle in accordance with good industrial hygiene and safety practice.

SECTION 12: Ecological information

12.1 Toxicity
No data available

Toxicity to daphnia and other aquatic invertebrates	Remarks: No data available (Tricosafluorododecanoic acid)
Toxicity to algae	Remarks: No data available (Tricosafluorododecanoic acid)

12.2 Persistence and degradability
No data available

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12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.
Discharge into the environment must be avoided.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

Further information
Not classified as dangerous in the meaning of transport regulations.

SECTION 15: Regulatory information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

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Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

Tricosafluorododecanoic acid	CAS-No. 307-55-1	Revision Date

Tricosafluorododecanoic acid	CAS-No. 307-55-1	Revision Date

New Jersey Right To Know Components

Tricosafluorododecanoic acid	CAS-No. 307-55-1	Revision Date

SECTION 16: Other information

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.3 Revision Date: 04/18/2021 Print Date: 07/08/2021

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Toronto Research Chemicals
products for innovative research

Safety Data Sheet - Version 5.0

Preparation Date 8/24/2016

Latest Revision Date (If Revised)

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product Identifier

Chemical Name Perfluorodecane Sulfonic Acid

Catalogue # P286540

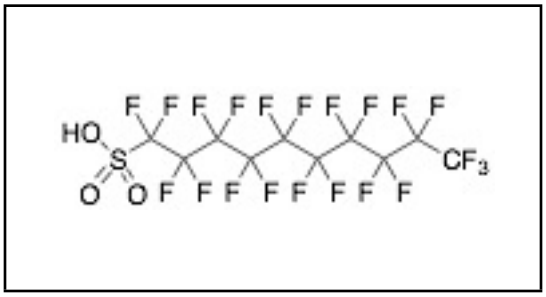
1.2 Relevant Identified Uses of the Substance or Mixture and Uses Advised Against

Product Uses To be used only for scientific research and development. Not for use in humans or animals.

1.3 Details of the Supplier of the Safety Data Sheet

Company Toronto Research Chemicals
2 Brisbane Road
Toronto, ON M3J 2J8
CANADA

Telephone +14166659696
FAX +14166654439
Email orders@trc-canada.com



1.4 Emergency Telephone Number

Emergency# +1(416) 665-9696 between 0800-1700 (GMT-5)

2. HAZARDS IDENTIFICATION

WHMIS Classification (Canada)

D2B Toxic Material Causing Other Toxic Effects
Moderate Skin/Eye/Respiratory Tract Irritant

WHMIS Symbols (Canada)



2.1/2.2 Classification of the Substance or Mixture and Label Elements

GHS Hazards Classification (According to EU Regulation 1272/2008 and US OSHA 1910.1200)

Skin Irritation (Category 2)
Serious Eye Irritation (Category 2A)
Specific Target Organ Toxicity, Single Exposure; Respiratory Tract Irritation (Category 3)

GHS Hazards Identification (According to EU Regulation 1272/2008 and US OSHA 1910.1200)

Signal Word Warning



GHS Hazard Statements

H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.

GHS Precautionary Statements

P261	Avoid breathing dust/fume/gas/mist/vapours/spray
P280	Wear protective gloves/protective clothing/eye protection/face protection.

P305/P351/P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

2.3 Unclassified Hazards/Hazards Not Otherwise Classified

No data available.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Molecular Formula: $C_{10}HF_{21}O_3S$ **Molecular Weight:** 600.14

CAS Registry #: 335-77-3 **EC#:**

Synonyms

1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-Heneicosafluoro-1-decanesulfonic Acid
1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-Henicosafluorodecane-1-sulfonate

3.2 Mixtures

Not a mixture.

4. FIRST AID MEASURES

4.1 Description of First Aid Measures

General Advice
If medical attention is required, show this safety data sheet to the doctor.

If Inhaled
If inhaled, move person to fresh air. If not breathing, give artificial respiration and consult a physician.

In Case of Skin Contact
Wash affected area with soap and water. Consult a physician if any exposure symptoms are observed.

In Case of Eye Contact
Immediately rinse eyes with plenty of water for at least 15 minutes. Consult a physician.

If Swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Do NOT induce vomiting unless advised to do so by a physician or Poison Control Center. Seek medical attention.

4.2 Most Important Symptoms and Effects, Both Acute and Delayed

The most important known symptoms and effects are described in the labeling (see section 2.2) and/or section 11.

4.3 Indication of any Immediate Medical Attention and Special Treatment Needed

No data available.

5. FIREFIGHTING MEASURES

5.1 Extinguishing Media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special Hazards Arising from the Substance or Mixture

Carbon oxides, Sulfur oxides, Sodium oxides, Hydrogen fluoride

5.3 Advice for Firefighters

Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further Information

No data available.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Method and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.
Keep in a dry place.

Storage conditions: Hygroscopic, -20°C Freezer, Under inert atmosphere

7.3 Specific End Uses

For scientific research and development only. Not for use in humans or animals.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control Parameters

Contains no components with established occupational exposure limits.

8.2 Exposure Controls

Appropriate Engineering Controls
A laboratory fumehood or other appropriate form of local exhaust ventilation should be used to avoid exposure.

Personal Protective Equipment
All recommendations below are advisory in nature and a risk assessment should be performed by the employer/end user prior to use of this product. The type of protective equipment must be selected based on the amount and concentration of the dangerous material being used in the workplace.

Eye/Face Protection
Safety goggles or face shield. All equipment should have been tested and approved under appropriate standards, such as NIOSH (US), CSA (Canada), or EN 166 (EU).

Skin Protection
Gloves should be used when handling this material. Gloves are to be inspected prior to use. Contaminated gloves are to be removed using proper glove removal technique so that the outer surface of the glove does not contact bare skin. Dispose of contaminated gloves after use in compliance with good laboratory practices and local requirements.

Gloves used for incidental exposures (splash protection) should be designated as “chemical resistant” by EU standard EN 374 with the resistance codes corresponding to the anticipated use of the material. Unrated gloves are not recommended.
Suggested gloves: AnsellPro Sol-Vex nitrile gloves style 37-175, 15 mil thickness.
Penetration time has not been determined.

Gloves used for prolonged direct exposure (immersion) should be designated “chemical resistant” as per EN 734 with the resistance codes corresponding to the anticipated use of the material.
Suggested gloves: AnsellPro Viton/Butyl gloves style 38-612, 4/8 mil thickness.
Penetration time has not been determined.

These recommendations may not apply if the material is mixed with any other chemical, or dissolved into a solution. A risk assessment must be performed to ensure the gloves will still offer acceptable protection.

Body Protection
Fire resistant (Nomex) lab coat or coveralls.

Respiratory Protection
Recommended respirators are NIOSH-approved N100 or CEN-approved FFP3 particulate respirators. These are to be only used as a backup to local exhaust ventilation or other engineering controls. If the respirator is the only means of protection, a full-face supplied air respirator must be used.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on Basic Physical and Chemical Properties

A) Appearance **B) Odour**

Very Dark Brown Solid

C) Odour Threshold
No data available

D) pH
No data available

E) Melting Point/Freezing Point
No data available

F) Initial Boiling Point/Boiling Range
No data available

G) Flash point
No data available

H) Evaporation Rate
No data available

I) Flammability (Solid/Gas)
No data available

J) Upper/Lower Flammability/Explosive Limits
No data available

K) Vapour Pressure
No data available

L) Vapour Density
No data available

M) Relative Density
No data available

N) Solubility
Acetone (Slightly), DMSO (Slightly), Methanol (Slightly)

O) Partition Coefficient: n-octanol/water
No data available

P) Auto-Ignition Temperature
No data available

Q) Decomposition Temperature
No data available

R) Viscosity
No data available

S) Explosive Properties
No data available

T) Oxidizing Properties
No data available

9.2 Other Information
no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available.

10.2 Chemical Stability
Stable under recommended storage conditions.

10.3 Possibility of Hazardous Reactions
No data available.

10.4 Conditions to Avoid
No data available.

10.5 Incompatible Materials
Strong oxidizing agents.

10.6 Hazardous Decomposition Products
In the event of fire: See section 5. **Other decomposition products:** No data available.

11. TOXICOLOGICAL INFORMATION

11.1 Information on Toxicological Effects

A) Acute Toxicity
Oral LD50: No data available.
Dermal LD50: No data available.
Inhalation LC50: No data available.

B) Skin Corrosion/Irritation
Moderate skin irritant.

C) Serious Eye Damage/Irritation
Moderate eye irritant.

D) Respiratory or Skin Sensitization
No data available

E) Germ Cell Mutagenicity
No data available

F) Carcinogenicity
No data available

G) Reproductive Toxicity/Teratogenicity
No data available

H) Single Target Organ Toxicity - Single Exposure

Moderate respiratory tract irritation.

I) Single Target Organ Toxicity - Repeated Exposure

No data available

J) Aspiration Hazard

No data available

K) Potential Health Effects and Routes of Exposure

Inhalation

May be harmful if inhaled. Causes respiratory tract irritation.

Ingestion

May be harmful if swallowed.

Skin

May be harmful if absorbed through skin. Causes skin irritation.

Eyes

Causes eye irritation.

L) Signs and Symptoms of Exposure

The most important known symptoms and effects are described in the labeling (see section 2.2) and/or section 11.

To the best of our knowledge, the chemical, physical, and toxicological properties of this material have not been thoroughly investigated.

M) Additional Information

RTECS: Not available.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

No data available.

12.2 Persistance and Degradability

No data available.

12.3 Bioaccumulative Potential

No data available.

12.4 Mobility in Soil

No data available.

12.5 Results of PBT and vPvB Assessment

No data available.

12.6 Other Adverse Effects

No data available.

13. DISPOSAL CONSIDERATIONS

13.1 Waste Treatment Methods

A) Product

Product may be burned in an incinerator equipped with afterburner and scrubber. Excess and expired materials are to be offered to a licensed hazardous material disposal company. Ensure that all Federal and Local regulations regarding the disposal and destruction of this material are followed.

B) Contaminated Packaging

Dispose of as above.

C) Other Considerations

Product is not to be disposed of in sanitary sewers, storm sewers, or landfills.

14. TRANSPORT INFORMATION

14.1 UN Number

DOT (US): N/A IATA: N/A IMDG: N/A ADR/RID: N/A

14.2 UN Proper Shipping Name

DOT (US)/IATA:

Not dangerous goods

IMDG/ARD/RID:

Not dangerous goods

14.3 Transport Hazard Class(es)

DOT (US): N/A IATA: N/A IMDG: N/A ADR/RID: N/A

14.4 Packing Group

DOT (US): N/A IATA: N/A IMDG: N/A ADR/RID: N/A

14.5 Environmental Hazards

DOT (US): None IATA: None IMDG: None ADR/RID: None

14.6 Special Precautions for User

None

15. REGULATORY INFORMATION

This safety data sheet complies with the requirements of WHMIS (Canada), OSHA 1910.1200 (US), and EU Regulation EC No. 1907/2006 (European Union).

15.1 Safety, Health and Environmental Regulations/Legislation Specific for the Substance or Mixture

A) Canada

DSL/NDSL Status: This product is not listed on the Canadian DSL/NDSL.

B) United States

TSCA Status: This product is not listed on the US EPA TSCA.

C) European Union

ECHA Status: This product is not registered with the EU ECHA.

15.2 Chemical Safety Assessment

No data available

16. OTHER INFORMATION

16.1 Revision History

Original Publication Date: 8/24/2016

16.2 List of Abbreviations

LD50	Median lethal dose of a substance required to kill 50% of a test population.
LC50	Medial lethal concentration of a substance required to kill 50% of a test population.
LDLo	Lowest known lethal dose
TDLo	Lowest known toxic dose
IARC	International Agency for Research on Cancer
NTP	National Toxicology Program
RTECS	Registry of Toxic Effects of Chemical Substances

16.3 Further Information

Copyright 2015. Toronto Research Chemicals Inc. Copies may be made for internal use only. The above information is believed to be correct to the best of our knowledge, but is to be only used as a guide. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated. Please take all due care when handling this product.

SAFETY DATA SHEET

Version 6.1
Revision Date 01/15/2020
Print Date 06/19/2021

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Perfluoroheptanoic acid

Product Number : 342041
Brand : Aldrich
CAS-No. : 375-85-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H302 Harmful if swallowed.

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H314	Causes severe skin burns and eye damage.

Precautionary statement(s)

P260	Do not breathe dust or mist.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER/doctor.
P321	Specific treatment (see supplemental first aid instructions on this label).
P363	Wash contaminated clothing before reuse.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	$C_7HF_{13}O_2$
Molecular weight	:	364.06 g/mol
CAS-No.	:	375-85-9
EC-No.	:	206-798-9

Component	Classification	Concentration
Perfluoroheptanoic acid		
	Acute Tox. 4; Skin Corr. 1B; Eye Dam. 1; H302, H314, H318	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

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If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen fluoride
Carbon oxides, Hydrogen fluoride

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

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SECTION 7: Handling and storage

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.Normal measures for preventive fire protection.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): 8B: Non-combustible, corrosive hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Do not let product enter drains.

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SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: crystalline Colour: beige
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/freezing point: 30 °C (86 °F)
f)	Initial boiling point and boiling range	175 °C 347 °F at 989 hPa
g)	Flash point	> 113.00 °C (> 235.40 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.792 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

SECTION 10: Stability and reactivity

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

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10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen fluoride
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen fluoride
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
No data available
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

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Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
UN number: 3261 Class: 8 Packing group: II
Proper shipping name: Corrosive solid, acidic, organic, n.o.s. (Perfluoroheptanoic acid)
Poison Inhalation Hazard: No

IMDG
UN number: 3261 Class: 8 Packing group: II EMS-No: F-A, S-B

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Proper shipping name: CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S. (Perfluoroheptanoic acid)

IATA
UN number: 3261 Class: 8 Packing group: II
Proper shipping name: Corrosive solid, acidic, organic, n.o.s. (Perfluoroheptanoic acid)

SECTION 15: Regulatory information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

Perfluoroheptanoic acid	CAS-No. 375-85-9	Revision Date

New Jersey Right To Know Components

Perfluoroheptanoic acid	CAS-No. 375-85-9	Revision Date

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

SECTION 16: Other information

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.1 Revision Date: 01/15/2020 Print Date: 06/19/2021

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Perfluorohexanesulfonic acid

Safety Data Sheet 616432T

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 09/21/2016 Version: 1.0

SECTION 1: Identification

1.1. Identification

Product form	:	Substance
Substance name	:	Perfluorohexanesulfonic acid
CAS No	:	355-46-4
Product code	:	6164-3-2T
Formula	:	C6HF13O3S
Synonyms	:	1,1,2,2,3,3,4,4,5,5,6,6,6-Tridecafluorohexane-1-sulfonic acid
Other means of identification	:	MFCD00042453

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture	:	Laboratory chemicals Manufacture of substances Scientific research and development

1.3. Details of the supplier of the safety data sheet

SynQuest Laboratories, Inc.
P.O. Box 309
Alachua, FL 32615 - United States of America
T (386) 462-0788 - F (386) 462-7097
info@synquestlabs.com - www.synquestlabs.com

1.4. Emergency telephone number

Emergency number	:	(844) 523-4086 (3E Company - Account 10069)

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

Classification (GHS-US)

Acute Tox. 4 (Oral)	H302 -	Harmful if swallowed
Skin Corr. 1B	H314 -	Causes severe skin burns and eye damage
Eye Dam. 1	H318 -	Causes serious eye damage
STOT SE 3	H335 -	May cause respiratory irritation

Full text of H-phrases: see section 16

2.2. Label elements

GHS-US labeling

Hazard pictograms (GHS-US) :



GHS05 GHS07

Signal word (GHS-US) : Danger

Hazard statements (GHS-US) :
H302 - Harmful if swallowed
H314 - Causes severe skin burns and eye damage
H335 - May cause respiratory irritation

Precautionary statements (GHS-US) :
P260 - Do not breathe dust, mist, spray
P264 - Wash skin thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P271 - Use only outdoors or in a well-ventilated area
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P301+P312 - If swallowed: Call a POISON CENTER or doctor/ physician if you feel unwell
P301+P330+P331 - If swallowed: rinse mouth. Do NOT induce vomiting
P303+P361+P353 - If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/ physician
P321 - Specific treatment (see supplemental first aid instructions on this label)
P330 - Rinse mouth

P363 - Wash contaminated clothing before reuse
P403+P233 - Store in a well-ventilated place. Keep container tightly closed
P405 - Store locked up
P501 - Dispose of contents/container to an approved waste disposal plant

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substance

Substance type : Mono-constituent

Name	Product identifier	%	Classification (GHS-US)
Perfluorohexanesulfonic acid (Main constituent)	(CAS No) 355-46-4	<= 100	Acute Tox. 4 (Oral), H302 Skin Corr. 1B, H314 Eye Dam. 1, H318 STOT SE 3, H335

Full text of H-phrases: see section 16

3.2. Mixture

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Move the affected personnel away from the contaminated area.

First-aid measures after inhalation : Remove person to fresh air and keep comfortable for breathing. If not breathing, give artificial respiration. Get immediate medical advice/attention.

First-aid measures after skin contact : Wash with plenty of soap and water. Remove contaminated clothing and shoes. Get immediate medical advice/attention.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

First-aid measures after ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth out with water. Get immediate medical advice/attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries : The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.

Symptoms/injuries after inhalation : Material is destructive to tissue of the mucuous membranes and upper respiratory tract. Cough, shortness of breath, headache, nausea.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Alcohol resistant foam. Carbon dioxide. Dry powder. Water spray. Use extinguishing media appropriate for surrounding fire.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Thermal decomposition generates: Carbon oxides. Hydrogen fluoride. Sulfur oxides.

5.3. Advice for firefighters

Firefighting instructions : In case of fire: Evacuate area.

Protection during firefighting : Wear gas tight chemically protective clothing in combination with self contained breathing apparatus. For further information refer to section 8: "Exposure controls/personal protection".

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Evacuate unnecessary personnel. Ensure adequate air ventilation. Do not breathe dust.

6.1.1. For non-emergency personnel

Emergency procedures : Only qualified personnel equipped with suitable protective equipment may intervene.

6.1.2. For emergency responders

Protective equipment	:	Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

6.2. Environmental precautions

Avoid release to the environment. Notify authorities if product enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

For containment	:	Stop leak if safe to do so.
Methods for cleaning up	:	Sweep or shovel spills into appropriate container for disposal. Minimize generation of dust.
Other information	:	For disposal of solid materials or residues refer to section 13 : "Disposal considerations".

6.4. Reference to other sections

No additional information available

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling	:	Do not handle until all safety precautions have been read and understood. Ensure good ventilation of the work station. Do not breathe dust, mist, spray. Wear personal protective equipment. Avoid contact with skin and eyes.
Hygiene measures	:	Handle in accordance with good industrial hygiene and safety procedures. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures	:	Comply with applicable regulations.
Storage conditions	:	Keep container closed when not in use. Hygroscopic. Keep contents under inert gas.
Incompatible materials	:	Refer to Section 10 on Incompatible Materials.
Storage area	:	Store in dry, cool, well-ventilated area.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

No additional information available

8.2. Exposure controls

Appropriate engineering controls	:	Ensure good ventilation of the work station. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.
Hand protection	:	Protective gloves. 29 CFR 1910.138: Hand Protection.
Eye protection	:	Chemical goggles or safety glasses. Face shield. 29 CFR 1910.133: Eye and Face Protection.
Skin and body protection	:	Wear suitable protective clothing.
Respiratory protection	:	In case of inadequate ventilation wear respiratory protection. 29 CFR 1910.134: Respiratory Protection.
Other information	:	Safety shoes. 29 CFR 1910.136: Foot Protection.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Solid
Color	:	No data available
Odor	:	No data available
Odor threshold	:	No data available
pH	:	No data available
Melting point	:	No data available
Freezing point	:	No data available
Boiling point	:	No data available
Flash point	:	No data available
Relative evaporation rate (butyl acetate=1)	:	No data available
Flammability (solid, gas)	:	No data available
Explosion limits	:	No data available
Explosive properties	:	No data available

Oxidizing properties	:	No data available
Vapor pressure	:	No data available
Relative density	:	No data available
Relative vapor density at 20 °C	:	No data available
Molecular mass	:	400.11 g/mol
Solubility	:	No data available
Log Pow	:	No data available
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

The product is stable at normal handling and storage conditions.

10.3. Possibility of hazardous reactions

No additional information available

10.4. Conditions to avoid

Keep away from heat, sparks and flame.

10.5. Incompatible materials

Strong bases. Strong oxidizing agents. Strong reducing agents.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced. Hazardous decomposition products in case of fire, see Section 5.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity	:	Oral: Harmful if swallowed.
Skin corrosion/irritation	:	Causes severe skin burns and eye damage.
Serious eye damage/irritation	:	Causes serious eye damage.
Respiratory or skin sensitization	:	Not classified
Germ cell mutagenicity	:	Not classified
Carcinogenicity	:	Not classified
Reproductive toxicity	:	Not classified
Specific target organ toxicity (single exposure)	:	May cause respiratory irritation.
Specific target organ toxicity (repeated exposure)	:	Not classified
Aspiration hazard	:	Not classified
Symptoms/injuries after inhalation	:	Material is destructive to tissue of the mucuous membranes and upper respiratory tract. Cough, shortness of breath, headache, nausea.

SECTION 12: Ecological information

12.1. Toxicity

No additional information available

12.2. Persistence and degradability

No additional information available

12.3. Bioaccumulative potential

No additional information available

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste treatment methods : Remove to an authorized incinerator equipped with an afterburner and a flue gas scrubber.

Waste disposal recommendations : Dispose of contents/container in accordance with licensed collector's sorting instructions.

Additional information : Recycle the material as far as possible.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

Transport document description : UN3261 Corrosive solid, acidic, organic, n.o.s., 8, II

UN-No.(DOT) : UN3261

Proper Shipping Name (DOT) : Corrosive solid, acidic, organic, n.o.s.

Transport hazard class(es) (DOT) : 8 - Class 8 - Corrosive material 49 CFR 173.136

Hazard labels (DOT) : 8 - Corrosive



Packing group (DOT) : II - Medium Danger

DOT Packaging Non Bulk (49 CFR 173.xxx) : 212

DOT Packaging Bulk (49 CFR 173.xxx) : 240

DOT Symbols : G - Identifies PSN requiring a technical name

DOT Special Provisions (49 CFR 172.102) : IB8 - Authorized IBCs: Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N); Rigid plastics (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2); Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2, 31HZ1 and 31HZ2); Fiberboard (11G); Wooden (11C, 11D and 11F); Flexible (13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, 13M1 or 13M2).
IP2 - When IBCs other than metal or rigid plastics IBCs are used, they must be offered for transportation in a closed freight container or a closed transport vehicle.
IP4 - Flexible, fiberboard or wooden IBCs must be sift-proof and water-resistant or be fitted with a sift-proof and water-resistant liner.
T3 - 2.65 178.274(d)(2) Normal..... 178.275(d)(2)
TP33 - The portable tank instruction assigned for this substance applies for granular and powdered solids and for solids which are filled and discharged at temperatures above their melting point which are cooled and transported as a solid mass. Solid substances transported or offered for transport above their melting point are authorized for transportation in portable tanks conforming to the provisions of portable tank instruction T4 for solid substances of packing group III or T7 for solid substances of packing group II, unless a tank with more stringent requirements for minimum shell thickness, maximum allowable working pressure, pressure-relief devices or bottom outlets are assigned in which case the more stringent tank instruction and special provisions shall apply. Filling limits must be in accordance with portable tank special provision TP3. Solids meeting the definition of an elevated temperature material must be transported in accordance with the applicable requirements of this subchapter.

DOT Packaging Exceptions (49 CFR 173.xxx) : 154

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 15 kg

DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 50 kg

DOT Vessel Stowage Location	:	B - (i) The material may be stowed ''on deck'' or ''under deck'' on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length; and (ii) ''On deck only'' on passenger vessels in which the number of passengers specified in paragraph (k)(2)(i) of this section is exceeded.
Other information	:	No supplementary information available.

TDG

No additional information available

Transport by sea

UN-No. (IMDG)	:	3261
Proper Shipping Name (IMDG)	:	CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S.
Class (IMDG)	:	8 - Corrosive substances
Packing group (IMDG)	:	II - substances presenting medium danger

Air transport

UN-No. (IATA)	:	3261
Proper Shipping Name (IATA)	:	Corrosive solid, acidic, organic, n.o.s.
Class (IATA)	:	8 - Corrosives
Packing group (IATA)	:	II - Medium Danger

SECTION 15: Regulatory information

15.1. US Federal regulations

Perfluorohexanesulfonic acid (355-46-4)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
EPA TSCA Regulatory Flag	S - S - indicates a substance that is identified in a proposed or final Significant New Uses Rule.

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

This product or mixture does not contain a toxic chemical or chemicals in excess of the applicable de minimis concentration as specified in 40 CFR §372.38(a) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

15.2. International regulations

CANADA

Perfluorohexanesulfonic acid (355-46-4)
Listed on the Canadian NDSL (Non-Domestic Substances List)

EU-Regulations

No additional information available

National regulations

Perfluorohexanesulfonic acid (355-46-4)
Listed on the Japanese ISHL (Industrial Safety and Health Law)

15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer and/or reproductive harm

SECTION 16: Other information

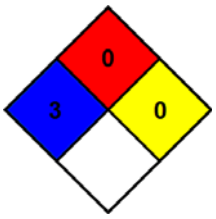
Full text of H-phrases:

Acute Tox. 4 (Oral)	Acute toxicity (oral) Category 4
Eye Dam. 1	Serious eye damage/eye irritation Category 1
Skin Corr. 1B	Skin corrosion/irritation Category 1B
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H302	Harmful if swallowed
H314	Causes severe skin burns and eye damage
H318	Causes serious eye damage
H335	May cause respiratory irritation

NFPA health hazard : 3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.

NFPA fire hazard : 0 - Materials that will not burn.

NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.



HMIS III Rating

Health : 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given

Flammability : 0 Minimal Hazard - Materials that will not burn

Physical : 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

SDS US (GHS HazCom 2012)

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is offered solely for your consideration, investigation, and verification. It does not represent any guarantee of the properties of the product nor that the hazard precautions or procedures described are the only ones which exist. SynQuest shall not be held liable or any damage resulting from handling or from contact with the above product.

SAFETY DATA SHEET

Version 6.7
Revision Date 09/28/2020
Print Date 06/19/2021

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Perfluorohexanoic acid

Product Number : 43809
Brand : Sigma-Aldrich
CAS-No. : 307-24-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H314 Causes severe skin burns and eye damage.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Precautionary statement(s)

P264	Wash skin thoroughly after handling.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P363	Wash contaminated clothing before reuse.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	C6HF11O2
Molecular weight	:	314.06 g/mol
CAS-No.	:	307-24-4
EC-No.	:	206-196-6

Component	Classification	Concentration
Undecafluorohexanoic acid		
	Skin Corr. 1B; Eye Dam. 1; H314, H318	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aider needs to protect himself. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

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If swallowed
After swallowing: make victim drink water (two glasses at most), avoid vomiting (risk of perforation). Call a physician immediately. Do not attempt to neutralise.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen fluoride
Not combustible.
Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections
For disposal see section 13.

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SECTION 7: Handling and storage

7.1 Precautions for safe handling
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Tightly closed.

Recommended storage temperature 2 - 8 °C

Store under argon.
Storage class (TRGS 510): 8A: Combustible, corrosive hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection
required

Body Protection
protective clothing

Respiratory protection
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid
b)	Odor	No data available
c)	Odor Threshold	No data available

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d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 12 - 14 °C (54 - 57 °F)
f)	Initial boiling point and boiling range	157 °C 315 °F at 989.2 hPa
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Relative density	1.757 g/cm3 at 20 °C (68 °F)
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen fluoride

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Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
No data available
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC:	No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

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SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and loc No mixing with other waste. Handle uncleaned containers like the product See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 3265 Class: 8 Packing group: II
Proper shipping name: Corrosive liquid, acidic, organic, n.o.s. (Undecafluorohexanoic acid)
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 3265 Class: 8 Packing group: II EMS-No: F-A, S-B
Proper shipping name: CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (Undecafluorohexanoic acid)

IATA
UN number: 3265 Class: 8 Packing group: II
Proper shipping name: Corrosive liquid, acidic, organic, n.o.s. (Undecafluorohexanoic acid)

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

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SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

SECTION 16: Other information

Further information
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.7 Revision Date: 09/28/2020 Print Date: 06/19/2021

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

AccuStandard, Inc.
125 Market St., New Haven, CT 06513 USA
Tel: 203-786-5290 Fax: 203-786-5287

SAFETY DATA SHEET

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

1.1 - Product Identifiers

Catalog Name: S-78941

Description: Perfluorohexane sulfonic acid in Methanol

1.2 - Relevant Identified Uses of the Substance or Mixture

Laboratory Chemical Reference Material

1.3 - Supplier Details

Company: AccuStandard, Inc.
125 Market St.
New Haven, CT 06513 USA

Telephone Number: 203-786-5290

Fax: 203-786-5287

Email: edocs@accustandard.com

1.4 - Emergency Telephone Number

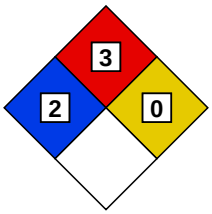
Emergency Phone #: AccuStandard, Inc.
1-203-502-7070 (USA)
+001-203-502-7070 (International)

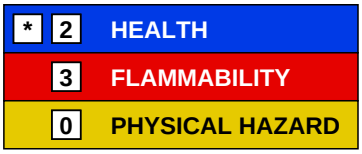
24 hours / 7 days a week

SECTION 2 - HAZARDS IDENTIFICATION

2.1 - GHS Label Elements







Signal Word: Danger

Hazard Codes:

H225 - Highly Flammable (Flammable liquids, category 2)

H301 - Toxic if swallowed. (Acute toxicity, oral, category 3)

H311 - Toxic if absorbed through skin. (Acute toxicity, dermal, category 3)

H315 - Irritating to skin. (Skin corrosion/irritation, category 2)

H320 - Irritating to eyes. (Eye damage/irritation, category 2B)

H332 - Harmful if inhaled. (Acute toxicity, inhalation, category 4)

H336 - Overexposure may cause dizziness, nausea, muscle weakness, narcosis and respiratory failure.

H360 - California Proposition 65 Warning: This product contains a component (or components) that may cause birth defects or other reproductive harm in a quantity greater than or equal to 0.1%.

H370 - Causes damage to organs. (Specific target organ toxicity, single exposure, category 1)

Precautionary Codes:

SECTION 2 - HAZARDS IDENTIFICATION *- continued*

2.1 - GHS Label Elements *- continued*

P202 - This product should only by used by persons trained in the safe handling of hazardous chemicals.

P233 - Store in a tightly closed container. (P404)

P262 - Do not get in eyes, on skin or clothing.

P264 - Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available.

P280 - Protective gloves must be worn to prevent skin contact.

P284 - Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), or a risk assessment shows air-purifying respirators are appropriate, use of a NIOSH/MSHA approved air supplied respirator is advised. Use a full-face respirator with multi-purpose combination (US) or type ABEK (EN14387) respirator cartridges in absence of proper environmental control. Always use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Engineering and/or administrative controls should be implemented to reduce exposure.

P331 - Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person.

P338 - Eye contact: Immediately flush with plenty of water. After initial flushing, remove and contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers.

P360 - Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.

2.2 - Other Hazards

2.2.1 - Symptom of Exposure Health/Environment

Highly Flammable (Flammable liquids, category 2)

Causes damage to organs. (Specific target organ toxicity, single exposure, category 1)

After ingestion or inhalation, initial symptoms may be only that of mild intoxication, but may become severe after 12 or 18 hours.

POISON: May be fatal or cause blindness if swallowed.

Overexposure may cause dizziness, nausea, muscle weakness, narcosis and respiratory failure.

2.2.2 - Potential Health Effects

Irritating to eyes. (Eye damage/irritation, category 2B)

Irritating to skin. (Skin corrosion/irritation, category 2)

Toxic if absorbed through skin. (Acute toxicity, dermal, category 3)

Irritating to mucous membrane and upper respiratory system.

Harmful if inhaled. (Acute toxicity, inhalation, category 4)

Toxic if swallowed. (Acute toxicity, oral, category 3)

2.2.3 - Routes of Entry

Inhalation, ingestion or skin contact.

2.2.4 - Carcinogenicity

California Proposition 65 Warning: This product contains a component (or components) that may cause birth defects or other reproductive harm in a quantity greater than or equal to 0.1%.

SECTION 3 - COMPOSITION / ANALYTES DATA

Description: Perfluorohexane sulfonic acid in Methanol

SECTION 3 - COMPOSITION / ANALYTES DATA *- continued*

Analyte	CAS #	% Concentration	ACGIH -TLV (mg/m^3)			OSHA -PEL (mg/m^3)		
			TWA	STEL	Skin	TWA	STEL	Skin
Perfluorohexane sulfonic acid	355-46-4	0.010						
Methanol	67-56-1	99.990				260		

SECTION 4 - FIRST AID MEASURES

4.1 - First Aid Procedures - General

Get medical assistance for all cases of overexposure.

4.2 - Eye Contact

Eye contact: Immediately flush with plenty of water. After initial flushing, remove and contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. (P338)

4.3 - Skin Contact

Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse. (P360)

4.4 - Inhalation

Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek immediate medical attention.

4.5 - Ingestion

Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person. (P331)

SECTION 5 - FIRE FIGHTING MEASURES

5.1 - Flammable Properties

Dangerous fire and explosive hazard.

Containers can build up pressure if exposed to heat.

Vapors can travel to a source of ignition and flash back.

During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

5.2 - Extinguishing Media

Use alcohol foam, carbon dioxide, dry chemical, or water spray when fighting fires involving this material.

5.3 - Protection of Firefighters

As in any fire, wear self-contained breathing apparatus pressure demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

6.1 - Spill Response

Wear suitable protective equipment listed under Exposure Controls / Personal Protection. Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards. Contain the release and eliminate its source, if this can be done without risk. Dispose as hazardous waste. Comply with Federal, State and local regulations.

SECTION 7 - HANDLING AND STORAGE

Store in a tightly closed container. (P404)

Keep refrigerated.

Avoid breathing vapors or mists.

Use with adequate ventilation.

Do not get in eyes, on skin or clothing. (P262)

Avoid prolonged or repeated exposure.

This product should only by used by persons trained in the safe handling of hazardous chemicals. (P202)

SECTION 8 - EXPOSURE CONTROLS

8.1 - Engineering Controls/PPE

Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available. (P264)

8.2 - General Hygene Considerations

Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), or a risk assessment shows air-purifying respirators are appropriate, use of a NIOSH/MSHA approved air supplied respirator is advised. Use a full-face respirator with multi-purpose combination (US) or type ABEK (EN14387) respirator cartridges in absence of proper environmental control. Always use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Engineering and/or administrative controls should be implemented to reduce exposure.

Material should be handled or transferred in an approved fume hood or with adequate ventilation.

Protective gloves must be worn to prevent skin contact. (P280)

(Chloroprene, natural rubber, nitrile, or equivalent)

Use eye protection tested and approved under the appropriate government standards such as NIOSH (US) or EN 166 (EU).

All recommendations are advisory only and must be evaluated by an industrial hygienist and/or safety officer familiar with the specific situation of anticipated use, such as concentration and amount of the substance in the workplace. Any recommendation should not be construed as offering an approval for any specific use of the product.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear liquid

Odor: N/A

Odor Threshold: N/A

pH: N/A

Melting Point: -93.9 °C

Boiling Point: 65 °C

Flash Point: 52 °F (11 °C) (tcc)

Evaporation Rate (Butyl Acetate=1): 5.9

Flammability Class: N/A

Lower Flammability Level: 6.7

Upper Flammability Level: 36.5

Vapor Pressure: 97 mmHg (20 °C)

Vapor Density (Air = 1): 1.1 g/L

Specific Gravity: 0.791 g/cm3

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES *- continued*

Solubility in Water: Very soluble

Partition Coefficient: log Pow: -0.77

Autoignition Temperature: 385 °C

Decomposition Temperature: N/A

Viscosity: N/A

VOC Content: N/A

Percent Volatile: 99.9+

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable

Materials to Avoid: Acids
Oxidizers

Hazardous Decomposition: Oxides of carbon; Formaldehyde

Hazardous Polymerization: Will not occur

Condition to Avoid: Heat; Contact with ignition sources

SECTION 11 - TOXICOLOGICAL INFORMATION

Human Health Toxicity

See section 2 for specific toxicological information for the ingredients of this product.

LD50 (Oral): Human - 143 mg/kg; Rat - 1500 mg/kg

LD50 (Dermal) : Rabbit - >2000 mg/kg

LC50 (Inhalation): Rat - >20 mg/L

WARNING: This product contains chemicals known to the state of California to cause birth defects or other reproductive harm.

No other information related to the toxicological properties of this product is available at this time.

SECTION 12 - ECOLOGICAL INFORMATION

Environmental Toxicity

By complying with sections 6 and 7 there should be no release to the environment.

LC50 (Fish): >1000 mg/L 96H

EC50 (Aquatic Invertebrate): >1000 mg/L 48H

BCF: 1.0

Hydrolyzes readily on contact with water. Readily biodegradable.

No other information related to the ecological properties of this product is available at this time.

SECTION 13 - DISPOSAL CONSIDERATIONS

Recycle or incinerate at any EPA approved facility or dispose in compliance with Federal, State and local regulations. Empty containers must be triple-rinsed prior to disposal.

SECTION 14 - TRANSPORT INFORMATION

Transportation Information (DOT/IATA)

SECTION 14 - TRANSPORT INFORMATION *- continued*

UN Number: UN1230

Class: 3

Packing Group: II

Proper Shipping Name: Methanol

Poison by Inhalation: No

Marine Pollutant: No

SECTION 15 - REGULATORY INFORMATION

WARNING: This product contains chemicals known to the state of California to cause birth defects or other reproductive harm.

This product is subject to SARA section 313 reporting requirements.

All components are listed on the TSCA Inventory.

For laboratory, research and development use only. Not for manufacturing or commercial purposes.

In addition to federal and state regulations, local regulations may apply. Check with your local regulatory authorities.

SECTION 16 - OTHER INFORMATION

This document has been designed to meet the requirements of OSHA, ANSI, GHS and CHIPs regulations. Chemicals are classified using the Globally Harmonized System for Classification and Labeling of Chemicals.

The statements contained herein are offered for informational purposes only and are based on technical data that we believe to be accurate. The manufacturer will not assume any liability for the accuracy and completeness of this information. Final determination of the suitability of the material is the responsibility of the user. Although certain hazards are described herein, the user should not presume that these are the only hazards that exist. Since conditions and manner of use are outside of the manufacturers control, we make

NO WARRANTY OF MERCHANTABILITY, EXPRESSED OR IMPLIED, AND ASSUME NO LIABILITY RESULTING FROM ITS USE.

Legend : N/A = Not Available ND = Not Determined NR = Not Regulated

Alteration of any information contained herein without written permission from the manufacturer is strictly prohibited.

HMIS/NFPA HAZARD INDEX

0 - Minimal
1 - Slight
2 - Moderate
3 - Serious
4 - Severe

* - Additional Hazard

GHS HAZARD INDEX

Category 1 - Most Severe
Category 5 - Least Severe

**** End of Document ****

SAFETY DATA SHEET

Santa Cruz Biotechnology, Inc.
Revision date 11-Dec-2015
Version 1

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier

Product Name	Perfluorononanoic acid
Product Code	SC-250678

Recommended use of the chemical and restrictions on use

For research use only. Not intended for diagnostic or therapeutic use.

Details of the supplier of the safety data sheet

Santa Cruz Biotechnology, Inc.
10410 Finnell Street
Dallas, TX 75220
831.457.3800
800.457.3801
scbt@scbt.com

Emergency telephone number

Chemtrec
1.800.424.9300 (Within USA)
+1.703.527.3887 (Outside USA)

2. HAZARDS IDENTIFICATION

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification

Skin corrosion/irritation	Category 1 Sub-category C
Serious eye damage/eye irritation	Category 1

Label elements

Signal word	Danger
Hazard statements	Causes severe skin burns and eye damage
Symbols/Pictograms	
Precautionary Statements - Prevention	Do not breathe dust/fume/gas/mist/vapors/spray Wash face, hands and any exposed skin thoroughly after handling Wear protective gloves/protective clothing/eye protection/face protection
Precautionary Statements - Response	Immediately call a POISON CENTER or doctor/physician IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing Immediately call a POISON CENTER or doctor/physician IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower Wash contaminated clothing before reuse IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing Immediately call a POISON CENTER or doctor/physician IF SWALLOWED: Rinse mouth. DO NOT induce vomiting
Precautionary Statements - Storage	Store locked up
Precautionary Statements - Disposal	Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Hazards not otherwise classified (HNOC)	Not applicable

Other Information

Unknown acute toxicity	100% of the mixture consists of ingredient(s) of unknown toxicity.

NFPA			HMIS		
	Health hazards	-		Health hazards	3
	Flammability	-		Flammability	1
	Stability	-		Physical hazards	1
	Physical and chemical properties	-		Personal protection	-

3. COMPOSITION/INFORMATION ON INGREDIENTS

CAS No	375-95-1
Molecular Weight	464.08
Formula	$C_9HF_{17}O_2$

Chemical Name	CAS No	Weight %	Oral LD50	Dermal LD50	Inhalation LC50
Perfluorononanoic acid	375-95-1	>98	-	-	-

4. FIRST AID MEASURES

First Aid Measures

General advice	Consult a physician if necessary. Remove to fresh air.
Eye contact	Wash with plenty of water.
Skin Contact	Wash skin with soap and water.
Inhalation	Remove to fresh air If breathing is difficult, give oxygen If not breathing, give artificial respiration
Ingestion	Never give anything by mouth to an unconscious person. Clean mouth with water.

Most important symptoms and effects, both acute and delayed

Symptoms	No information available.

Indication of any immediate medical attention and special treatment needed

Note to physicians	Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

Suitable Extinguishing Media	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Unsuitable Extinguishing Media	None.

Specific hazards arising from the chemical

Specific hazards arising from the chemical	Thermal decomposition can lead to release of toxic/corrosive gases and vapors.
Hazardous combustion products	Hydrogen fluoride. Carbon oxides. Phosgene.

Explosion data

Sensitivity to Mechanical Impact	No information available.
Sensitivity to Static Discharge	No information available.

Protective equipment and precautions for firefighters

Protective equipment and precautions for firefighters	As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions	Ensure adequate ventilation, especially in confined areas.

Environmental precautions

Environmental precautions	See Section 12 for additional Ecological Information.

Methods and material for containment and cleaning up

Methods for containment	Prevent further leakage or spillage if safe to do so.
Methods for cleaning up	Use personal protective equipment as required. Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry. Take up mechanically, placing in appropriate containers for disposal. Avoid creating dust. Clean contaminated surface thoroughly.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling	Thermal decomposition can lead to release of toxic/corrosive gases and vapors.

Conditions for safe storage, including any incompatibilities

Storage Conditions	Keep containers tightly closed in a dry, cool and well-ventilated place. Store at room temperature.
Incompatible materials	None known based on information supplied.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines	This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Appropriate engineering controls

Engineering Controls	Showers Eyewash stations Ventilation systems

Individual protection measures, such as personal protective equipment

Eye/face protection	Wear safety glasses with side shields (or goggles).
Skin and Body Protection	Wear protective gloves and protective clothing.
Respiratory protection	If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.
General Hygiene Considerations	Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Solid
Appearance	crystalline powder
Odor	No information available

Property	**Values**
pH	No information available
Melting point/freezing point	63 °C
Boiling point	218 °C
Flash point	No information available
Density	No information available
Evaporation rate	No information available
Upper flammability limits	No information available
Lower flammability limit	No information available
Vapor pressure	No information available
Vapor density	No information available
Specific gravity	No information available
Water solubility	No information available
Solubility in other solvents	No information available
Partition coefficient	No information available
Autoignition temperature	No information available
Decomposition temperature	No information available
Kinematic viscosity	No information available
Explosive properties	No information available
Oxidizing properties	No information available

10. STABILITY AND REACTIVITY

Reactivity	Not applicable
Chemical stability	Stable under recommended storage conditions.
Possibility of Hazardous Reactions	None under normal processing.
Hazardous polymerization	No information available.
Conditions to avoid	Extremes of temperature and direct sunlight.
Incompatible materials	Strong oxidizing agents.
Hazardous Decomposition Products	Hydrogen fluoride. Carbon oxides. Phosgene.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation	No data available.
Eye contact	No data available.
Skin Contact	No data available.
Ingestion	No data available.

Information on toxicological effects

Symptoms	No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Chronic Toxicity	No information available.

Numerical measures of toxicity - Product Information

Unknown acute toxicity	100% of the mixture consists of ingredient(s) of unknown toxicity

12. ECOLOGICAL INFORMATION

Ecotoxicity	May cause long lasting harmful effects to aquatic life

100% of the mixture consists of components(s) of unknown hazards to the aquatic environment.

Persistence and degradability	No information available.
Bioaccumulation	No information available.
Mobility	No information available.

13. DISPOSAL CONSIDERATIONS

Disposal of wastes	Disposal should be in accordance with applicable regional, national and local laws and regulations.
Contaminated packaging	Do not reuse container.

14. TRANSPORT INFORMATION

DOT	Not regulated
IMDG	Not regulated
IATA	Not regulated

15. REGULATORY INFORMATION

International Inventories

All of the components in the product are on the following Inventory lists
TSCA (United States): Canada (DSL/NDSL) Europe (EINECS/ELINCS/NLP) ENCS (Japan):

Chemical Name	TSCA	DSL	NDSL	EINECS	ELINCS	ENCS	IECSC	KECL	PICCS	AICS
Perfluorononanoic acid	X	-	X	X	-	X	-	-	-	-

X - Listed
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances

US Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories

Acute health hazard	No
Chronic Health Hazard	No
Fire hazard	No
Sudden release of pressure hazard	No
Reactive hazard	No

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

US State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations
This product does not contain any substances regulated by state right-to-know regulations

16. OTHER INFORMATION

Revision note	No information available

Disclaimer
The information provided in this Material Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet

SAFETY DATA SHEET

Version 6.4
Revision Date 04/18/2021
Print Date 06/19/2021

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Perfluorooctanoic acid

Product Number : 171468
Brand : Aldrich
CAS-No. : 335-67-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 1B), H360
Effects on or via lactation, H362
Specific target organ toxicity - repeated exposure (Category 1), Liver, H372

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



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Signal word	Danger
Hazard statement(s)	
H302	Harmful if swallowed.
H314	Causes severe skin burns and eye damage.
H351	Suspected of causing cancer.
H360	May damage fertility or the unborn child.
H362	May cause harm to breast-fed children.
H372	Causes damage to organs (Liver) through prolonged or repeated exposure.
Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P263	Avoid contact during pregnancy/ while nursing.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P363	Wash contaminated clothing before reuse.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	Pentadecafluorooctanoic acid Perfluorocaprylic acid Perfluorooctanoic acid
Formula	:	$C_8HF_{15}O_2$
Molecular weight	:	414.07 g/mol
CAS-No.	:	335-67-1
EC-No.	:	206-397-9

Component	Classification	Concentration
pentadecafluorooctanoic acid		
	Acute Tox. 4; Skin Corr.	<= 100 %

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	1B; Eye Dam. 1; Carc. 2; Repr. 1B; Lact. ; STOT RE 1; H302, H314, H318, H351, H360, H362, H372	

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most), avoid vomiting (risk of perforation). Call a physician immediately. Do not attempt to neutralise.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Hydrogen fluoride
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

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5.4 Further information

Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.
Storage class (TRGS 510): 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

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8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: > 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Acid-resistant protective clothing

Respiratory protection
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: flakes Color: colorless

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b)	Odor	stinging
c)	Odor Threshold	No data available
d)	pH	2.6 at 1 g/l at 20 °C (68 °F)
e)	Melting point/freezing point	Melting point/range: 55 - 56 °C (131 - 133 °F) - lit.
f)	Initial boiling point and boiling range	189 °C 372 °F at 981 hPa - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	0.69 hPa at 25 °C (77 °F)
l)	Vapor density	No data available
m)	Relative density	No data available
n)	Water solubility	3.4 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 6.30 - Potential bioaccumulation, (Lit.)
p)	Autoignition temperature	No data available
q)	Decomposition temperature	> 300 °C (> 572 °F) -
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Violent reactions possible with:
Strong oxidizing agents
Strong acids
Bases

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10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Acute toxicity estimate Oral - 500.1 mg/kg
(Expert judgment)

Acute toxicity estimate Inhalation - 4 h - 11.1 mg/l
(Expert judgment)

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
Causes serious eye damage.

Respiratory or skin sensitization

Germ cell mutagenicity
No data available

No data available
No data available

Carcinogenicity
Suspected of causing cancer.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (pentadecafluorooctanoic acid)

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
May damage the unborn child.
Studies indicating a hazard to babies during the lactation period

Specific target organ toxicity - single exposure

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Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure. - Liver

Aspiration hazard

11.2 Additional Information

RTECS: RH0781000

Cough, Shortness of breath, Headache, Nausea, Vomiting
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After absorption:

gastric pain
Nausea
Vomiting
Drowsiness
somnolence

Handle in accordance with good industrial hygiene and safety practice.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

No data available

Toxicity to daphnia and other aquatic invertebrates	Remarks: No data available (pentadecafluorooctanoic acid)
Toxicity to algae	Remarks: No data available (pentadecafluorooctanoic acid)

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

Discharge into the environment must be avoided.

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 3261 Class: 8 Packing group: III
Proper shipping name: Corrosive solid, acidic, organic, n.o.s. (pentadecafluorooctanoic acid)
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 3261 Class: 8 Packing group: III EMS-No: F-A, S-B
Proper shipping name: CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S. (pentadecafluorooctanoic acid)

IATA
UN number: 3261 Class: 8 Packing group: III
Proper shipping name: Corrosive solid, acidic, organic, n.o.s. (pentadecafluorooctanoic acid)

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
pentadecafluorooctanoic acid	335-67-1	2018-02-01

New Jersey Right To Know Components

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SECTION 16: Other information

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.4 Revision Date: 04/18/2021 Print Date: 06/19/2021

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SAFETY DATA SHEET

Version 6.1
Revision Date 09/29/2020
Print Date 07/25/2021

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Perfluorooctanesulfonamide

Product Number : CDS010729
Brand : Aldrich
CAS-No. : 754-91-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Long-term (chronic) aquatic hazard (Category 4), H413

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram none

Signal word none

Hazard statement(s)
H413 May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)
P273 Avoid release to the environment.
P501 Dispose of contents/ container to an approved waste disposal

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plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	Heptadecafluorooctanesulphonamide
Formula	:	$C_8H_2F_{17}NO_2S$
Molecular weight	:	499.14 g/mol
CAS-No.	:	754-91-6
EC-No.	:	212-046-0

No components need to be disclosed according to the applicable regulations.

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Consult a physician. Show this material safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

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5.2 Special hazards arising from the substance or mixture
Carbon oxides, Nitrogen oxides (NOx), Sulfur oxides, Hydrogen fluoride

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.
Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): 13: Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

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Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	120 °C 248 °F at 3 hPa
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available

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o)	Partition coefficient: n-octanol/water	log Pow: 5.8
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Nitrogen oxides (NOx), Sulfur oxides, Hydrogen fluoride
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
Causes serious eye damage.

Respiratory or skin sensitization

Germ cell mutagenicity
No data available
No data available
No data available

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Carcinogenicity
Suspected of causing cancer.

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
May damage the unborn child.
Studies indicating a hazard to babies during the lactation period

Specific target organ toxicity - single exposure

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard

Additional Information
RTECS: RG9701400

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Handle in accordance with good industrial hygiene and safety practice.

SECTION 12: Ecological information

12.1 Toxicity
No data available

Toxicity to daphnia and other aquatic invertebrates	Remarks: No data available(Heptadecafluorooctanesulphonamide)
Toxicity to algae	Remarks: No data available(Heptadecafluorooctanesulphonamide)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Accumulation in aquatic organisms is expected.

12.4 Mobility in soil

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Discharge into the environment must be avoided.

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

Further information
Not classified as dangerous in the meaning of transport regulations.

SECTION 15: Regulatory information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

Heptadecafluorooctanesulphonamide	CAS-No. 754-91-6	Revision Date

New Jersey Right To Know Components

Heptadecafluorooctanesulphonamide	CAS-No. 754-91-6	Revision Date

California Prop. 65 Components

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This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

SECTION 16: Other information

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.1 Revision Date: 09/29/2020 Print Date: 07/25/2021

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TCI AMERICA

Material Safety Data Sheet

HAZARD WARNINGS	RISK PHRASES	PROTECTIVE CLOTHING
	**Corrosive to eyes and skin on contact.** **Toxic compound, do not ingest or inhale. Avoid all contact with this material.** **Environmental hazard.** **This material is toxic to aquatic organisms and may cause long term adverse effects to the aquatic environment.** **POSSIBLE MUTAGEN. MINIMIZE EXPOSURE.**	

Section I. Chemical Product and Company Identification

Chemical Name: **Heptadecafluorooctanesulfonic Acid**

Catalog Number	H0781
Synonym	Perfluorooctanesulfonic Acid
Chemical Formula	$C_8HF_{17}O_3S$
CAS Number	1763-23-1

Supplier: TCI America
9211 N. Harborgate St.
Portland OR
1-800-423-8616

In case of Emergency Call: **Chemtrec®**
(800) 424-9300 (U.S.)
(703) 527-3887 (International)

Section II. Composition and Information on Ingredients

Chemical Name	CAS Number	Percent (%)	TLV/PEL	Toxicology Data
Heptadecafluorooctanesulfonic Acid	1763-23-1	Min. 98.0 (T)	This compound is classified as a possible mutagen. There is no acceptable exposure limit for a mutagen.	Rat LD_{50} (oral) 154 mg/kg

Section III. Hazards Identification

Acute Health Effects

Corrosive to skin, eyes, and respiratory system. Liquid or spray mist may produce tissue damage, particularly in mucous membranes of the eyes, mouth and respiratory tract. Skin contact may produce burns. Eye contact can result in corneal damage or blindness. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Corrosive materials may cause serious injury if ingested.
Toxic if ingested or inhaled. Avoid prolonged contact with this material. Overexposure may result in serious illness or death. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.

Chronic Health Effects

CARCINOGENIC EFFECTS : Not available.
MUTAGENIC EFFECTS : Not available.
TERATOGENIC EFFECTS : Not available.
DEVELOPMENTAL TOXICITY: Reproductive effects.
Rat TDLo Oral 50 mg/kg, female 19-20 days of pregnancy
TOXIC EFFECTS:
Effects on Newborn - Viability index
Effects on Newborn - Other neonatal measures or effects
Effects on Newborn - Growth statistics
Rat TDLo Oral 100 mg/kg, female 19-20 days of pregnancy
TOXIC EFFECTS:
Effects on Newborn - Stillbirth
Rat TDLo Unreported 50 mg/kg, female 19-20 days of pregnancy
TOXIC EFFECTS:
Specific Developmental Abnormalities - Respiratory system
Effects on Newborn - Live birth index
Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section IV. First Aid Measures

Eye Contact

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Inhalation

If the victim is not breathing, perform mouth-to-mouth resuscitation. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, oxygen can be administered. Seek medical attention if respiration problems do not improve.

Ingestion

DO NOT INDUCE VOMITING. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive.

Continued on Next Page **Emergency phone number (800) 424-9300**

Section V. Fire and Explosion Data

Flammability	May be combustible at high temperature.	Auto-Ignition	Not available.
Flash Points	Not available.	Flammable Limits	Not available.
Combustion Products	These products are toxic carbon oxides (CO, CO_2), halogenated compounds, sulfur oxides (SO_x). WARNING: Highly toxic HF gas is produced during combustion.		
Fire Hazards	Not available.		
Explosion Hazards	Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.		
Fire Fighting Media and Instructions	SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. DO NOT use water jet. Consult with local fire authorities before attempting large scale fire-fighting operations.		

Section VI. Accidental Release Measures

Spill Cleanup Instructions	Corrosive material. Toxic material. Environmentally hazardous material. Possibly mutagenic material. Stop leak if without risk. DO NOT get water inside container. DO NOT touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all sources of ignition. Consult federal, state, and/or local authorities for assistance on disposal.

Section VII. Handling and Storage

Handling and Storage Information	CORROSIVE. TOXIC. ENVIRONMENTAL HAZARD. POSSIBLE MUTAGEN. Keep locked up. Keep container dry. Keep away from heat. Mechanical exhaust required. When not in use, tightly seal the container and store in a dry, cool place. Avoid excessive heat and light. DO NOT ingest. Do not breathe dust. Never add water to this product. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Treat symptomatically and supportively. Always store away from incompatible compounds such as oxidizing agents, alkalis (bases).

Section VIII. Exposure Controls/Personal Protection

Engineering Controls	Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.
Personal Protection	Face shield. Lab coat. Dust respirator. Boots. Gloves. A MSHA/NIOSH approved respirator must be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product. 
Exposure Limits	This compound is classified as a possible mutagen. There is no acceptable exposure limit for a mutagen.

Section IX. Physical and Chemical Properties

Physical state @ 20°C	Solid. (White crystal ~ powder.)	Solubility	Soluble in water.
Specific Gravity	Not available.		
Molecular Weight	500.13	Partition Coefficient	Not available.
Boiling Point	260°C (500°F)	Vapor Pressure	0.3 Pa (@ 25°C)
Melting Point	90°C (194°F)	Vapor Density	Not available.
Refractive Index	Not available.	Volatility	Not available.
Critical Temperature	Not available.	Odor	Not available.
Viscosity	Not available.	Taste	Not available.

Section X. Stability and Reactivity Data

Stability	This material is stable if stored under proper conditions. (See Section VII for instructions)
Conditions of Instability	Avoid excessive heat and light.
Incompatibilities	Reactive with oxidizing agents, alkalis (bases).

Continued on Next Page

Printed 1/6/2010.

Section XI. Toxicological Information

RTECS Number	RG9701600
Routes of Exposure	Eye Contact. Ingestion. Inhalation. Skin contact.
Toxicity Data	Rat LD_{50} (oral) 154 mg/kg
Chronic Toxic Effects	**CARCINOGENIC EFFECTS** : Not available. **MUTAGENIC EFFECTS** : Not available. **TERATOGENIC EFFECTS** : Not available. **DEVELOPMENTAL TOXICITY**: Reproductive effects. Rat TDLo Oral 50 mg/kg, female 19-20 days of pregnancy TOXIC EFFECTS: Effects on Newborn - Viability index Effects on Newborn - Other neonatal measures or effects Effects on Newborn - Growth statistics Rat TDLo Oral 100 mg/kg, female 19-20 days of pregnancy TOXIC EFFECTS: Effects on Newborn - Stillbirth Rat TDLo Unreported 50 mg/kg, female 19-20 days of pregnancy TOXIC EFFECTS: Specific Developmental Abnormalities - Respiratory system Effects on Newborn - Live birth index Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.
Acute Toxic Effects	Corrosive to skin, eyes, and respiratory system. Liquid or spray mist may produce tissue damage, particularly in mucous membranes of the eyes, mouth and respiratory tract. Skin contact may produce burns. Eye contact can result in corneal damage or blindness. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Corrosive materials may cause serious injury if ingested. Toxic if ingested or inhaled. Avoid prolonged contact with this material. Overexposure may result in serious illness or death. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.

Section XII. Ecological Information

Ecotoxicity	Not available.
Environmental Fate	Perfluorooctane sulfonic acid's production and use as a precursor for fluorinated surfactants has resulted in its release to the environment through various waste streams. If released to air, an estimated vapor pressure of 2.0X10-3 mm Hg at 25 deg C indicates perfluorooctane sulfonic acid will exist solely as a vapor in the ambient atmosphere. Vapor-phase perfluorooctane sulfonic acid will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 110 days. If released to soil, perfluorooctane sulfonic acid is expected to have no mobility based upon an estimated Koc of 100,000. Perfluorooctane sulfonic acid is essentially nonvolatile. Perfluoro compound recalcitrance can be attributed to the stability conferred by fluorine substitutes and the absence of structures susceptible to electrophilic or nucleophilic attack. Perfluorooctane sulfonic acid reached 0% of its theoretical BOD in four weeks using an activated sludge inoculum in the manometric respirometry test. If released into water, perfluorooctane sulfonic acid is expected to adsorb to suspended solids and sediment based upon the estimated Koc. Volatilization from water surfaces is not expected to be an important fate process as the compound is essentially nonvolatile; an estimated volatilization half-life for a model pond is 3 years if adsorption is considered. An estimated BCF of 56 suggests the potential for bioconcentration in aquatic organisms is moderate. Monitoring studies however would suggest that this compound is highly bioaccumulative. As a class, fluorinated organic compounds are resistant to hydrolysis. Occupational exposure to perfluorooctane sulfonic acid may occur through inhalation and dermal contact with this compound at workplaces where perfluorooctane sulfonic acid is produced or used. Monitoring data indicate that the general population may be exposed to perfluorooctane sulfonic acid via ingestion of contaminated fish and drinking water, and dermal contact with this compound and other products containing perfluorooctane sulfonic acid.

Section XIII. Disposal Considerations

Waste Disposal	Recycle to process, if possible. Consult your local regional authorities. You may be able to dissolve or mix material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber system. Observe all federal, state and local regulations when disposing of the substance.

Section XIV. Transport Information

DOT Classification	DOT CLASS 8: Corrosive material DOT CLASS 6.1: Toxic material
PIN Number	UN2923
Proper Shipping Name	Corrosive solid, toxic, n.o.s.
Packing Group (PG)	II
DOT Pictograms	

Continued on Next Page Emergency phone number (800) 424-9300

Section XV. Other Regulatory Information and Pictograms

TSCA Chemical Inventory (EPA)	This compound is **ON** the EPA Toxic Substances Control Act (TSCA) inventory list.
WHMIS Classification (Canada)	CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS E: Corrosive solid. On NDSL.
EINECS Number (EEC)	217-179-8
EEC Risk Statements	R23/24/25- Toxic by inhalation, in contact with skin and if swallowed. R34- Causes burns. R46- May cause heritable genetic damage. R47- May cause birth defects. R51- Toxic to aquatic organisms. R53- May cause long-term adverse effects in the aquatic environment.
Japanese Regulatory Data	ENCS No. 2-1595

Section XVI. Other Information

Version 1.0
Validated on 1/6/2010.
Printed 1/6/2010.

Notice to Reader

TCI laboratory chemicals are for research purposes only and are NOT intended for use as drugs, food additives, households, or pesticides. The information herein is believed to be correct, but does not claim to be all inclusive and should be used only as a guide. Neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All chemical reagents must be handled with the recognition that their chemical, physiological, toxicological, and hazardous properties have not been fully investigated or determined. All chemical reagents should be handled only by individuals who are familiar with their potential hazards and who have been fully trained in proper safety, laboratory, and chemical handling procedures. Although certain hazards are described herein, we can not guarantee that these are the only hazards which exist. Our MSDS sheets are based only on data available at the time of shipping and are subject to change without notice as new information is obtained. Avoid long storage periods since the product is subject to degradation with age and may become more dangerous or hazardous. It is the responsibility of the user to request updated MSDS sheets for products that are stored for extended periods. Disposal of unused product must be undertaken by qualified personnel who are knowledgeable in all applicable regulations and follow all pertinent safety precautions including the use of appropriate protective equipment (e.g. protective goggles, protective clothing, breathing equipment, facial mask, fume hood). For proper handling and disposal, always comply with federal, state, and local regulations.

SAFETY DATA SHEET

Version 6.2
Revision Date 04/30/2021
Print Date 06/19/2021

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Perfluoropentanoic acid

Product Number : 396575
Brand : Aldrich
CAS-No. : 2706-90-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Serious eye damage (Category 1), H318
Reproductive toxicity (Category 2), H361

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H318 Causes serious eye damage.
H361 Suspected of damaging fertility or the unborn child.

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Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Nonafluorovaleric acid
Perfluoropentanoic acid
Nonafluoropentanoic acid

Formula : $C_5HF_9O_2$
Molecular weight : 264.05 g/mol
CAS-No. : 2706-90-3
EC-No. : 220-300-7

Component	Classification	Concentration
Perfluorovaleric acid		
	Eye Dam. 1; Repr. 2; H318, H361	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

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If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen fluoride
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections
For disposal see section 13.

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SECTION 7: Handling and storage

7.1 Precautions for safe handling

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep locked up or in an area accessible only to qualified or authorized persons.
Storage class (TRGS 510): 8A: Combustible, corrosive hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection
required

Body Protection
protective clothing

Respiratory protection
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: clear, liquid Color: light brown
b)	Odor	No data available

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c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	140 °C 284 °F - lit.
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
Strong oxidizing agents

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10.6 Hazardous decomposition products

In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Acute toxicity estimate Oral - 2,501 mg/kg
(Expert judgment)

Inhalation: No data available

Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
Suspected of damaging the unborn child.
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Not available

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Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., Cough, Shortness of breath, Headache, Nausea

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

Further information
Not classified as dangerous in the meaning of transport regulations.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

SECTION 16: Other information

Further information
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.2 Revision Date: 04/30/2021 Print Date: 06/19/2021

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

AccuStandard, Inc.
125 Market St., New Haven, CT 06513 USA
Tel: 203-786-5290 Fax: 203-786-5287

SAFETY DATA SHEET

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

1.1 - Product Identifiers

Catalog Name: PFOA-025S

Description: Perfluoropentanesulfonic acid in Methanol

1.2 - Relevant Identified Uses of the Substance or Mixture

Laboratory Chemical Reference Material

1.3 - Supplier Details

Company: AccuStandard, Inc.
125 Market St.
New Haven, CT 06513 USA

Telephone Number: 203-786-5290

Fax: 203-786-5287

Email: edocs@accustandard.com

1.4 - Emergency Telephone Number

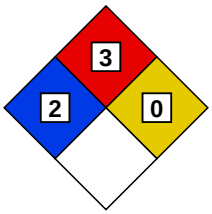
Emergency Phone #: AccuStandard, Inc.
1-203-502-7070 (USA)
+001-203-502-7070 (International)

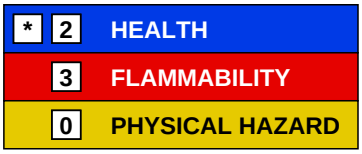
24 hours / 7 days a week

SECTION 2 - HAZARDS IDENTIFICATION

2.1 - GHS Label Elements







Signal Word: Danger

Hazard Codes:

H225 - Highly Flammable (Flammable liquids, category 2)

H301 - Toxic if swallowed. (Acute toxicity, oral, category 3)

H311 - Toxic if absorbed through skin. (Acute toxicity, dermal, category 3)

H315 - Irritating to skin. (Skin corrosion/irritation, category 2)

H320 - Irritating to eyes. (Eye damage/irritation, category 2B)

H332 - Harmful if inhaled. (Acute toxicity, inhalation, category 4)

H336 - Overexposure may cause dizziness, nausea, muscle weakness, narcosis and respiratory failure.

H360 - California Proposition 65 Warning: This product contains a component (or components) that may cause birth defects or other reproductive harm in a quantity greater than or equal to 0.1%.

H370 - Causes damage to organs. (Specific target organ toxicity, single exposure, category 1)

Precautionary Codes:

SECTION 2 - HAZARDS IDENTIFICATION *- continued*

2.1 - GHS Label Elements *- continued*

P202 - This product should only by used by persons trained in the safe handling of hazardous chemicals.

P233 - Store in a tightly closed container. (P404)

P262 - Do not get in eyes, on skin or clothing.

P264 - Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available.

P280 - Protective gloves must be worn to prevent skin contact.

P284 - Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), or a risk assessment shows air-purifying respirators are appropriate, use of a NIOSH/MSHA approved air supplied respirator is advised. Use a full-face respirator with multi-purpose combination (US) or type ABEK (EN14387) respirator cartridges in absence of proper environmental control. Always use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Engineering and/or administrative controls should be implemented to reduce exposure.

P331 - Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person.

P338 - Eye contact: Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers.

P360 - Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.

2.2 - Other Hazards

2.2.1 - Symptom of Exposure Health/Environment

Highly Flammable (Flammable liquids, category 2)

Causes damage to organs. (Specific target organ toxicity, single exposure, category 1)

After ingestion or inhalation, initial symptoms may be only that of mild intoxication, but may become severe after 12 or 18 hours.

POISON: May be fatal or cause blindness if swallowed.

Overexposure may cause dizziness, nausea, muscle weakness, narcosis and respiratory failure.

2.2.2 - Potential Health Effects

Irritating to eyes. (Eye damage/irritation, category 2B)

Irritating to skin. (Skin corrosion/irritation, category 2)

Toxic if absorbed through skin. (Acute toxicity, dermal, category 3)

Irritating to mucous membrane and upper respiratory system.

Harmful if inhaled. (Acute toxicity, inhalation, category 4)

Toxic if swallowed. (Acute toxicity, oral, category 3)

2.2.3 - Routes of Entry

Inhalation, ingestion or skin contact.

2.2.4 - Carcinogenicity

California Proposition 65 Warning: This product contains a component (or components) that may cause birth defects or other reproductive harm in a quantity greater than or equal to 0.1%.

SECTION 3 - COMPOSITION / ANALYTES DATA

Description: Perfluoropentanesulfonic acid in Methanol

SECTION 3 - COMPOSITION / ANALYTES DATA *- continued*

Analyte	CAS #	% Concentration	ACGIH -TLV (mg/m³)			OSHA -PEL (mg/m³)		
			TWA	STEL	Skin	TWA	STEL	Skin
Perfluoropentanesulfonic acid	2706-91-4	0.010						
Methanol	67-56-1	99.990				260		

SECTION 4 - FIRST AID MEASURES

4.1 - First Aid Procedures - General

Get medical assistance for all cases of overexposure.

4.2 - Eye Contact

Eye contact: Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. (P338)

4.3 - Skin Contact

Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse. (P360)

4.4 - Inhalation

Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek immediate medical attention.

4.5 - Ingestion

Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person. (P331)

SECTION 5 - FIRE FIGHTING MEASURES

5.1 - Flammable Properties

Dangerous fire and explosive hazard.

Containers can build up pressure if exposed to heat.

Vapors can travel to a source of ignition and flash back.

During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

5.2 - Extinguishing Media

Use alcohol foam, carbon dioxide, dry chemical, or water spray when fighting fires involving this material.

5.3 - Protection of Firefighters

As in any fire, wear self-contained breathing apparatus pressure demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

6.1 - Spill Response

Wear suitable protective equipment listed under Exposure Controls / Personal Protection. Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards. Contain the release and eliminate its source, if this can be done without risk. Dispose as hazardous waste. Comply with Federal, State and local regulations.

SECTION 7 - HANDLING AND STORAGE

Store in a tightly closed container. (P404)

Store in a cool place below 14 °F (-10 °C).

Avoid breathing vapors or mists.

Use with adequate ventilation.

Do not get in eyes, on skin or clothing. (P262)

Avoid prolonged or repeated exposure.

This product should only by used by persons trained in the safe handling of hazardous chemicals. (P202)

SECTION 8 - EXPOSURE CONTROLS

8.1 - Engineering Controls/PPE

Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available. (P264)

8.2 - General Hygene Considerations

Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), or a risk assessment shows air-purifying respirators are appropriate, use of a NIOSH/MSHA approved air supplied respirator is advised. Use a full-face respirator with multi-purpose combination (US) or type ABEK (EN14387) respirator cartridges in absence of proper environmental control. Always use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Engineering and/or administrative controls should be implemented to reduce exposure.

Material should be handled or transferred in an approved fume hood or with adequate ventilation.

Protective gloves must be worn to prevent skin contact. (P280)

(Chloroprene, natural rubber, nitrile, or equivalent)

Use eye protection tested and approved under the appropriate government standards such as NIOSH (US) or EN 166 (EU).

All recommendations are advisory only and must be evaluated by an industrial hygienist and/or safety officer familiar with the specific situation of anticipated use, such as concentration and amount of the substance in the workplace. Any recommendation should not be construed as offering an approval for any specific use of the product.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear liquid

Odor: N/A

Odor Threshold: N/A

pH: N/A

Melting Point: -93.9 °C

Boiling Point: 65 °C

Flash Point: 52 °F (11 °C) (tcc)

Evaporation Rate (Butyl Acetate=1): 5.9

Flammability Class: N/A

Lower Flammability Level: 6.7

Upper Flammability Level: 36.5

Vapor Pressure: 97 mmHg (20 °C)

Vapor Density (Air = 1): 1.1 g/L

Specific Gravity: 0.791 g/cm3

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES *- continued*

Solubility in Water: Very soluble

Partition Coefficient: log Pow: -0.77

Autoignition Temperature: 385 °C

Decomposition Temperature: N/A

Viscosity: N/A

VOC Content: N/A

Percent Volatile: 99.9+

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable

Materials to Avoid: Acids
Oxidizers

Hazardous Decomposition: Oxides of carbon; Formaldehyde

Hazardous Polymerization: Will not occur

Condition to Avoid: Heat; Contact with ignition sources

SECTION 11 - TOXICOLOGICAL INFORMATION

Human Health Toxicity

See section 2 for specific toxicological information for the ingredients of this product.

LD50 (Oral): Human - 143 mg/kg; Rat - 1500 mg/kg

LD50 (Dermal) : Rabbit - >2000 mg/kg

LC50 (Inhalation): Rat - >20 mg/L

WARNING: This product contains chemicals known to the state of California to cause birth defects or other reproductive harm.

No other information related to the toxicological properties of this product is available at this time.

SECTION 12 - ECOLOGICAL INFORMATION

Environmental Toxicity

By complying with sections 6 and 7 there should be no release to the environment.

LC50 (Fish): >1000 mg/L 96H

EC50 (Aquatic Invertebrate): >1000 mg/L 48H

BCF: 1.0

Hydrolyzes readily on contact with water. Readily biodegradable.

No other information related to the ecological properties of this product is available at this time.

SECTION 13 - DISPOSAL CONSIDERATIONS

Recycle or incinerate at any EPA approved facility or dispose in compliance with Federal, State and local regulations. Empty containers must be triple-rinsed prior to disposal.

SECTION 14 - TRANSPORT INFORMATION

Transportation Information (DOT/IATA)

SECTION 14 - TRANSPORT INFORMATION *- continued*

UN Number: UN1230

Class: 3

Packing Group: II

Proper Shipping Name: Methanol

Poison by Inhalation: No

Marine Pollutant: No

SECTION 15 - REGULATORY INFORMATION

This product contains a compound or compounds subject to EU Regulation (EC) No 1907/2006 (REACH) on Annex XIV, Annex XVII, and/or Article 59. Refer to the below table for details.

WARNING: This product contains chemicals known to the state of California to cause birth defects or other reproductive harm.

This product is subject to SARA section 313 reporting requirements.

All components are listed on the TSCA Inventory.

For laboratory, research and development use only. Not for manufacturing or commercial purposes.

In addition to federal and state regulations, local regulations may apply. Check with your local regulatory authorities.

			REACH (1907/2006)		
Analyte	CAS #	% Concentration	Annex XIV	Annex XVII	Article 59
Methanol	67-56-1	99.990		X	

SECTION 16 - OTHER INFORMATION

This document has been designed to meet the requirements of OSHA, ANSI, GHS and CHIPs regulations. Chemicals are classified using the Globally Harmonized System for Classification and Labeling of Chemicals and CLP Regulation (EC) No. 1272/2008.

The statements contained herein are offered for informational purposes only and are based on technical data that we believe to be accurate. The manufacturer will not assume any liability for the accuracy and completeness of this information. Final determination of the suitability of the material is the responsibility of the user. Although certain hazards are described herein, the user should not presume that these are the only hazards that exist. Since conditions and manner of use are outside of the manufacturers control, we make

NO WARRANTY OF MERCHANTABILITY, EXPRESSED OR IMPLIED, AND ASSUME NO LIABILITY RESULTING FROM ITS USE.

Legend : N/A = Not Available ND = Not Determined NR = Not Regulated

Alteration of any information contained herein without written permission from the manufacturer is strictly prohibited.

HMIS/NFPA HAZARD INDEX

0 - Minimal
1 - Slight
2 - Moderate
3 - Serious
4 - Severe

* - Additional Hazard

GHS HAZARD INDEX

Category 1 - Most Severe
Category 5 - Least Severe

**** End of Document ****

SAFETY DATA SHEET

Version 8.4
Revision Date 09/05/2024
Print Date 11/18/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Perfluorotetradecanoic acid

Product Number : 38400
Brand : Sigma-Aldrich
CAS-No. : 376-06-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 4), H332
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 1B), H360
Effects on or via lactation, H362

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Specific target organ toxicity - repeated exposure (Category 1), Liver, H372

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Danger

Hazard Statements

H302 + H332	Harmful if swallowed or if inhaled.
H351	Suspected of causing cancer.
H360	May damage fertility or the unborn child.
H362	May cause harm to breast-fed children.
H372	Causes damage to organs (Liver) through prolonged or repeated exposure.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust.
P263	Avoid contact during pregnancy/ while nursing.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	C14HF27O2
Molecular weight	:	714.12 g/mol
CAS-No.	:	376-06-7
EC-No.	:	206-803-4

Component	Classification	Concentration
Perfluorotetradecanoic acid		
	Acute Tox. 4; Carc. 2; Repr. 1B; Lact. ; STOT RE	<= 100 %

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	1; H302, H332, H351, H360, H362, H372	

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Nature of decomposition products not known.
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

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5.4 Further information

Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Store under argon.

Storage class
Storage class (TRGS 510): 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

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SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection
Handle with impervious gloves.

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter type P3
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

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SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	130 - 135 °C (266 - 275 °F)
f)	Initial boiling point and boiling range	270 °C 518 °F at 1,013 hPa
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	No data available
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

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SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Violent reactions possible with:
Strong oxidizing agents

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Acute toxicity estimate Oral - 500.1 mg/kg
(Expert judgment)
Acute toxicity estimate Inhalation - 4 h - 11.1 mg/l - vapor

(Expert judgment)
Dermal: No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
Remarks: Causes serious eye damage.

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
Suspected of causing cancer.

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

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OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
May damage the unborn child.
Studies indicating a hazard to babies during the lactation period

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.
- Liver

Aspiration hazard
No data available

11.2 Additional Information

After absorption:

gastric pain
Nausea
Vomiting
Drowsiness
somnolence

Handle in accordance with good industrial hygiene and safety practice.

SECTION 12: Ecological information

12.1 Toxicity

No data available

Toxicity to daphnia and other aquatic invertebrates	Remarks: No data available (Perfluorotetradecanoic acid)
Toxicity to algae	Remarks: No data available (Perfluorotetradecanoic acid)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	Remarks: No data available (Perfluorotetradecanoic acid)

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

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12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

Discharge into the environment must be avoided.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)

Not dangerous goods

IMDG

Not dangerous goods

IATA

Not dangerous goods

Further information

Not classified as dangerous in the meaning of transport regulations.

SECTION 15: Regulatory information

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

The life science business of Merck KGaA, Darmstadt, Germany
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SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Perfluorotetradecanoic acid	376-06-7	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

The following substance(s) is/are subject to a Significant New Use Rule:

Perfluorotetradecanoic acid	376-06-7	See 40 CFR § 721.10536; Final Rule

The following substance(s) is/are subject to TSCA 12(b) export notification requirements:

Perfluorotetradecanoic acid	376-06-7

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 8.4 Revision Date: 09/05/2024 Print Date: 11/18/2024

The life science business of Merck KGaA, Darmstadt, Germany
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SAFETY DATA SHEET

Version 6.2
Revision Date 07/16/2021
Print Date 07/25/2021

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Perfluoroundecanoic acid

Product Number : 446777
Brand : Aldrich
CAS-No. : 2058-94-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 4), H332
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 1B), H360
Effects on or via lactation, H362
Specific target organ toxicity - repeated exposure (Category 1), Liver, H372

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

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Hazard statement(s)

H302 + H332	Harmful if swallowed or if inhaled.
H351	Suspected of causing cancer.
H360	May damage fertility or the unborn child.
H362	May cause harm to breast-fed children.
H372	Causes damage to organs (Liver) through prolonged or repeated exposure.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P263	Avoid contact during pregnancy/ while nursing.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	$C_{11}HF_{21}O_2$
Molecular weight	:	564.09 g/mol
CAS-No.	:	2058-94-8
EC-No.	:	218-165-4

Component	Classification	Concentration
Henicosafluoroundecanoic acid		
	Acute Tox. 4; Carc. 2; Repr. 1B; Lact. ; STOT RE 1; H302, H332, H351, H360, H362, H372	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

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SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Nature of decomposition products not known.
Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air on intense heating.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

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SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.
Storage class (TRGS 510): 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

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Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with impervious gloves.

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
protective clothing

Respiratory protection
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 96 - 101 °C (205 - 214 °F) - lit.
f)	Initial boiling point and boiling range	160 °C 320 °F at 80 hPa - lit.
g)	Flash point	113 °C (235 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid,	No data available

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	gas)	
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	No data available
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
Forms explosive mixtures with air on intense heating.
A range from approx. 15 Kelvin below the flash point is to be rated as critical.
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Strong heating.

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

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SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Acute toxicity estimate Oral - 500.1 mg/kg
(Expert judgment)
Acute toxicity estimate Inhalation - 4 h - 11.1 mg/l
(Expert judgment)
Dermal: No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
Causes serious eye damage.

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available
No data available
No data available

Carcinogenicity
Suspected of causing cancer.

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
May damage the unborn child.
Studies indicating a hazard to babies during the lactation period

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure. - Liver

Aspiration hazard
No data available

11.2 Additional Information

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After absorption:

gastric pain
Nausea

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Vomiting
Drowsiness
somnolence

Handle in accordance with good industrial hygiene and safety practice.

SECTION 12: Ecological information

12.1 Toxicity

No data available

Toxicity to daphnia and other aquatic invertebrates	Remarks: No data available (Henicosafluoroundecanoic acid)
Toxicity to algae	Remarks: No data available (Henicosafluoroundecanoic acid)

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

Discharge into the environment must be avoided.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)

Not dangerous goods

IMDG

Not dangerous goods

IATA

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Not dangerous goods

Further information
Not classified as dangerous in the meaning of transport regulations.

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

Henicosafluoroundecanoic acid	CAS-No. 2058-94-8	Revision Date

New Jersey Right To Know Components

Henicosafluoroundecanoic acid	CAS-No. 2058-94-8	Revision Date

SECTION 16: Other information

Further information
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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SAFETY DATA SHEET

Creation Date 01-May-2012 **Revision Date** 11-Aug-2014 **Revision Number** 1

1. Identification

Product Name **Phenanthrene**

Cat No. : **AC130090000; AC130090050; AC130090500; AC130095000**

Synonyms No information available

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute oral toxicity	Category 4

Label Elements

Signal Word
Warning

Hazard Statements
Harmful if swallowed



Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth

Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
Phenanthrene	85-01-8	>95

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Obtain medical attention. Wash off immediately with plenty of water for at least 15 minutes.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion Clean mouth with water and drink afterwards plenty of water. Get medical attention if symptoms occur.

Most important symptoms/effects None reasonably foreseeable.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature Not applicable
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Do not allow run-off from fire fighting to enter drains or water courses.

Hazardous Combustion Products
Carbon monoxide (CO) Carbon dioxide (CO_2)
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
1	1	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment. Avoid dust formation.

Environmental Precautions Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Sweep up or vacuum up spillage and collect in suitable container for disposal. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Wear personal protective equipment. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Avoid dust formation.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

- **Eye/face Protection** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
- **Skin and body protection** Long sleeved clothing.
- **Respiratory Protection** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
- **Hygiene Measures** Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	Beige
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	95 - 101 °C / 203 - 213.8 °F
Boiling Point/Range	336 °C / 636.8 °F
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	1 mmHg @ 116 °C
Vapor Density	Not applicable
Relative Density	1.063
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	Not applicable
Decomposition temperature	No information available
Viscosity	Not applicable
Molecular Formula	C14 H10
Molecular Weight	178.23

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Avoid dust formation.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Phenanthrene	1.8 g/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Phenanthrene	85-01-8	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea

Phenanthrene	Not listed	LC50 = 3.2 mg/L 96h	Not listed	LC50 = 0.35 mg/L 48h

Persistence and Degradability Insoluble in water May persist

Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility.

Component	log Pow
Phenanthrene	4.46

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE,SOLID, N.O.S.
Hazard Class 9
Packing Group III

TDG

UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE,SOLID, N.O.S.
Hazard Class 9
Packing Group III

IATA

UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.*
Hazard Class 9
Packing Group III

IMDG/IMO

UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class 9
Packing Group III

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Phenanthrene	X	X	-	201-581-5	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Phenanthrene	85-01-8	>95	1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Phenanthrene	-	-	X	X

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Phenanthrene	5000 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Phenanthrene	X	X	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class Non-controlled

16. Other information

Prepared By Regulatory Affairs

Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date	01-May-2012
Revision Date	11-Aug-2014
Print Date	11-Aug-2014
Revision Summary	This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

SAFETY DATA SHEET

Version 6.10
Revision Date 09/06/2024
Print Date 09/06/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Phenol

Product Number : P5566
Brand : Sigma-Aldrich
Index-No. : 604-001-00-2
CAS-No. : 108-95-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 3), H331
Acute toxicity, Dermal (Category 3), H311

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Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Germ cell mutagenicity (Category 2), H341
Specific target organ toxicity - repeated exposure (Category 2), Nervous system, Kidney, Liver, Skin, H373
Short-term (acute) aquatic hazard (Category 2), H401
Long-term (chronic) aquatic hazard (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word: Danger

Hazard Statements

H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled.
H314	Causes severe skin burns and eye damage.
H341	Suspected of causing genetic defects.
H373	May cause damage to organs (Nervous system, Kidney, Liver, Skin) through prolonged or repeated exposure.
H411	Toxic to aquatic life with long lasting effects.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

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2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Vesicant., Rapidly absorbed through skin.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Hydroxybenzene

Formula : C_6H_6O
Molecular weight : 94.11 g/mol
CAS-No. : 108-95-2
EC-No. : 203-632-7
Index-No. : 604-001-00-2

Component	Classification	Concentration
Phenol		
	Acute Tox. 3; Skin Corr. 1B; Eye Dam. 1; Muta. 2; STOT RE 2; Aquatic Acute 2; Aquatic Chronic 2; H301, H331, H311, H314, H318, H341, H373, H401, H411 Concentration limits: >= 3 %: Skin Corr. 1B, H314; 1 - < 3 %: Skin Irrit. 2, H315; 1 - < 3 %: Eye Irrit. 2, H319;	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
After contact with skin: rinse out with polyethylene glycol 400 or a mixture of polyethylene glycol 300/ethanol 2:1 and wash with plenty of water. If neither is available wash with plenty of water. Immediately take off contaminated clothing. Call a physician immediately.

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In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
If swallowed: give water to drink (two glasses at most). Seek medical advice immediately. In exceptional cases only, if medical care is not available within one hour, induce vomiting (only in persons who are wide awake and fully conscious), administer activated charcoal (20 - 40 g in a 10% slurry) and consult a doctor as quickly as possible. Do not attempt to neutralise.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air on intense heating.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

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6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.
Storage stability Recommended storage temperature
2 - 8 °C
Handle and store under inert gas. Light sensitive.

Storage class
Storage class (TRGS 510): 6.1A: Combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Phenol	108-95-2	TWA	5 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not classifiable as a human carcinogen		

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		Danger of cutaneous absorption		
		TWA	5 ppm 19 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		
		C	15.6 ppm 60 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		
		TWA	5 ppm 19 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		PEL	5 ppm 19 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Phenol	108-95-2	Phenol	250mg/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Viton®
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please

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contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Viton®
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter A-(P3)
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts/vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	stinging
c)	Odor Threshold	0.005 ppm
d)	pH	6.0
e)	Melting point/freezing point	Melting point/ range: 38 - 43 °C (100 - 109 °F)
f)	Initial boiling point and boiling range	181.8 °C 359.2 °F at 1,013 hPa
g)	Flash point	79.0 °C (174.2 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 9.5 %(V) Lower explosion limit: 1.3 %(V)
k)	Vapor pressure	0.53 hPa at 20.0 °C (68.0 °F)
l)	Vapor density	3.2 at 20 °C(68 °F) - (Air = 1.0)
m)	Density	1.13 g/cm3 at 25 °C (77 °F) - DIN 51757
	Relative density	No data available

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n)	Water solubility	87 g/l at 25 °C (77 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 1.47 at 30 °C (86 °F) - (ECHA), Bioaccumulation is not expected.
p)	Autoignition temperature	715 °C (1319 °F) at 1,013 hPa
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	38.2 mN/m at 50.0 °C (122.0 °F)
Relative vapor density	3.2 at 20 °C (68 °F) - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity

Forms explosive mixtures with air on intense heating.
A range from approx. 15 Kelvin below the flash point is to be rated as critical.
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .
Contains the following stabilizer(s):
Hypophosphorous acid (0.15 %)

10.3 Possibility of hazardous reactions

Exothermic reaction with:
Aluminum
Aldehydes
halogens
hydrogen peroxide
iron(III) compounds
Oxidizing agents
Strong acids
Strong bases
formaldehyde
Risk of explosion with:
nitrites
nitrates
salts of oxyhalogenic acids
peroxi compounds

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10.4 Conditions to avoid
Strong heating.

10.5 Incompatible materials
rubber, various plastics, various alloys, various metals

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Acute toxicity estimate Oral - 100.1 mg/kg
(Calculation method)
Acute toxicity estimate Oral - 100.1 mg/kg
(Expert judgment)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
Acute toxicity estimate Inhalation - 4 h - 0.51 mg/l - dust/mist(Calculation method)

Acute toxicity estimate Inhalation - 4 h - 0.51 mg/l - dust/mist

(Expert judgment)
Symptoms: Irritation, Lung edema
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
Acute toxicity estimate Dermal - 660 mg/kg
(Calculation method)
LD50 Dermal - Rat - female - 660 mg/kg
(OECD Test Guideline 402)
No data available

Skin corrosion/irritation
Skin - In vitro study
Result: Causes burns.
(OECD Test Guideline 431)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Corrosive
(OECD Test Guideline 405)
Remarks: Causes serious eye damage.
Risk of blindness!

Respiratory or skin sensitization
Sensitisation test: - Guinea pig
Result: negative
Remarks: (IUCLID)

Germ cell mutagenicity
Suspected of causing genetic defects.
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: Chinese hamster ovary cells
Metabolic activation: Metabolic activation

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Method: OECD Test Guideline 473
Result: positive
Test Type: Mutagenicity (mammal cell test): micronucleus.
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 487
Result: positive

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
May cause damage to organs through prolonged or repeated exposure.
- Nervous system, Kidney, Liver, Skin
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Aspiration hazard
No data available

11.2 Additional Information

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Circulatory collapse, tachypnea, paralysis, Convulsions, Coma., necrosis of mouth and G.I. Tract, Jaundice, respiratory failure, cardiac arrest
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Onchorhynchus clarki - 8.9 mg/l - 96 h

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	(US-EPA)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Ceriodaphnia dubia (water flea) - 3.1 mg/l - 48 h (US-EPA)
Toxicity to algae	static test EC50 - Pseudokirchneriella subcapitata (algae) - 61.1 mg/l - 96 h (US-EPA)
Toxicity to bacteria	static test IC50 - microorganisms - 21 mg/l - 24 h Remarks: (ECHA)
Toxicity to fish(Chronic toxicity)	semi-static test NOEC - Fish - 0.077 mg/l - 60 d Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	semi-static test NOEC - Daphnia magna (Water flea) - 0.16 mg/l - 16 d Remarks: (ECHA)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 100 h Result: 62 % - Readily biodegradable. (OECD Test Guideline 301C)

12.3 Bioaccumulative potential

Bioaccumulation	Danio rerio (zebra fish) - 5 h at 25 °C - 2 mg/l(Phenol) Bioconcentration factor (BCF): 17.5 (OECD Test Guideline 305) Remarks: Does not bioaccumulate.

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 1671 Class: 6.1 Packing group: II
Proper shipping name: Phenol, solid
Reportable Quantity (RQ): 1000 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1671 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: PHENOL, SOLID
Marine pollutant : yes

IATA
UN number: 1671 Class: 6.1 Packing group: II
Proper shipping name: Phenol, solid

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Phenol	108-95-2	1000	1000

SARA 304 Extremely Hazardous Substances Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Phenol	108-95-2	1000	1000

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

Components	CAS-No.	Component TPQ (lbs)
Phenol	108-95-2	10000
Phenol	108-95-2	500*

*: Solid in the molten or powdered form (particles < 100 microns), in solution, or meeting the NFPA reactivity criteria

SARA 311/312 Hazards : Acute Health Hazard
Chronic Health Hazard

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SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Phenol	108-95-2	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.10 Revision Date: 09/06/2024 Print Date: 09/06/2024

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SAFETY DATA SHEET

Version 3.10
Revision Date 03/03/2015
Print Date 02/07/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Potassium

Product Number : 244864
Brand : Aldrich

CAS-No. : 7440-09-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Substances and mixtures, which in contact with water, emit flammable gases (Category 1), H260
Skin corrosion (Category 1A), H314
Serious eye damage (Category 1), H318
Carcinogenicity (Category 1A), H350

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H260	In contact with water releases flammable gases which may ignite spontaneously.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H350	May cause cancer.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P223	Keep away from any possible contact with water, because of violent reaction and possible flash fire.

P231 + P232	Handle under inert gas. Protect from moisture.
P260	Do not breathe dust or mist.
P264	Wash skin thoroughly after handling.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P281	Use personal protective equipment as required.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P363	Wash contaminated clothing before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P402 + P404	Store in a dry place. Store in a closed container.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Reacts violently with water.
May form explosive peroxides.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Formula : K
Molecular weight : 39.10 g/mol

Hazardous components

Component		Classification	Concentration
Potassium			
CAS-No. EC-No. Index-No.	7440-09-7 231-119-8 019-001-00-2	Water-react. 1; Skin Corr. 1A; Eye Dam. 1; H260, H314	>= 90 - <= 100 %
Paraffin oils			
CAS-No. EC-No.	8012-95-1 232-384-2	Carc. 1A; H350	>= 1 - < 5 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Dry powder

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Potassium oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.Keep away from sources of ignition - No smoking.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Handle and store under inert gas.
Storage class (TRGS 510): Hazardous materials, which set free flammable gases upon contact with water

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Paraffin oils	8012-95-1	STEL	10.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation 2014 Adoption Not classifiable as a human carcinogen		
		Upper Respiratory Tract irritation 2014 Adoption Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Upper Respiratory Tract irritation Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		
		TWA	5.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Not classifiable as a human carcinogen		
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Upper Respiratory Tract irritation Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Fragments Colour: grey
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 64 °C (147 °F)
f)	Initial boiling point and boiling range	774 °C (1,425 °F) at 1,013 hPa (760 mmHg)
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower	No data available

	flammability or explosive limits	
k)	Vapour pressure	0.12 hPa (0.09 mmHg) at 260 °C (500 °F)
l)	Vapour density	No data available
m)	Relative density	0.860 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Reacts violently with water.

10.4 Conditions to avoid
Exposure to moisture

10.5 Incompatible materials
Oxidizing agents, Strong oxidizing agents, Carbon oxides, Reacts violently with water., Reacts with water to generate Hydrogen gas.

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: 1 - Group 1: Carcinogenic to humans (Paraffin oils)

NTP: Known to be human carcinogenThe reference note has been added by TD based on the background information of the NTP. (Paraffin oils)

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 2257 Class: 4.3 Packing group: I
Proper shipping name: Potassium
Reportable Quantity (RQ):

Poison Inhalation Hazard: No

IMDG
UN number: 2257 Class: 4.3 Packing group: I EMS-No: F-G, S-N
Proper shipping name: POTASSIUM

IATA
UN number: 2257 Class: 4.3 Packing group: I
Proper shipping name: Potassium
IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Reactivity Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Potassium	7440-09-7	1993-04-24
Paraffin oils	8012-95-1	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Potassium	7440-09-7	1993-04-24
Paraffin oils	8012-95-1	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Potassium	7440-09-7	1993-04-24
Paraffin oils	8012-95-1	2007-03-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Paraffin oils	8012-95-1	1987-02-27

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Carc.	Carcinogenicity
Eye Dam.	Serious eye damage
H260	In contact with water releases flammable gases which may ignite spontaneously.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H350	May cause cancer.
Skin Corr.	Skin corrosion
Water-react.	Substances and mixtures, which in contact with water, emit flammable gases

HMIS Rating
Health hazard: 3

Chronic Health Hazard:	*
Flammability:	4
Physical Hazard	2

NFPA Rating

Health hazard:	3
Fire Hazard:	4
Reactivity Hazard:	2
Special hazard.I:	W

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.10 Revision Date: 03/03/2015 Print Date: 02/07/2016

SAFETY DATA SHEET

Version 8.5
Revision Date 12/21/2023
Print Date 08/10/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : 1,2-Dichloropropane

Product Number : D72182
Brand : Aldrich
Index-No. : 602-020-00-0
CAS-No. : 78-87-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 3), H331
Carcinogenicity (Category 1B), H350
Short-term (acute) aquatic hazard (Category 2), H401

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

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Pictogram	
Signal Word	Danger

Hazard Statements

H225	Highly flammable liquid and vapor.
H302	Harmful if swallowed.
H331	Toxic if inhaled.
H350	May cause cancer.
H401	Toxic to aquatic life.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Propylene dichloride

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Formula	:	$C_3H_6Cl_2$
Molecular weight	:	112.99 g/mol
CAS-No.	:	78-87-5
EC-No.	:	201-152-2
Index-No.	:	602-020-00-0

Component	Classification	Concentration
1,2-Dichloropropane		
	Flam. Liq. 2; Acute Tox. 4; Acute Tox. 3; Carc. 1B; Aquatic Acute 2; H225, H302, H331, H350, H401	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Consult a physician. Show this material safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Dry powder Dry sand

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Unsuitable extinguishing media
Do NOT use water jet.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas
Combustible.

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.

Advice on protection against fire and explosion
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions

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Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
1,2-Dichloropropane	78-87-5	TWA	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Dermal Sensitization Not classifiable as a human carcinogen		
		Potential Occupational Carcinogen		
		TWA	75 ppm 350 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	75 ppm 350 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	110 ppm 510 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

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Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Color: clear
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -100 °C (-148 °F) - lit.
f)	Initial boiling point and boiling range	95 - 96 °C 203 - 205 °F - lit.

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g)	Flash point	15.0 °C (59.0 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 14.5 %(V) Lower explosion limit: 3.4 %(V)
k)	Vapor pressure	66.17 - 71.98 hPa at 25 °C (77 °F)
l)	Vapor density	No data available
m)	Density	1.156 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	1.297 g/l at 25 °C (77 °F) - soluble
o)	Partition coefficient: n-octanol/water	log Pow: 1.98 - 2.28 - Bioaccumulation is not expected.
p)	Autoignition temperature	557.0 °C (1034.6 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	0.757 mm2/s at 20 °C (68 °F) -
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

Surface tension	0.03 N/m at 20 °C (68 °F)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Vapors may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents

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10.6 Hazardous decomposition products

In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 1,947 mg/kg
Remarks: (RTECS)
LC50 Inhalation - Rat - male and female - 4 h - 9.4 mg/l - vapor

Remarks: (ECHA)
LD50 Dermal - Rabbit - male - 10,100 mg/kg
Remarks: (ECHA)

Skin corrosion/irritation
Skin - Rabbit
Result: slight irritation - 4 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Chicken eye
Result: No eye irritation
(OECD Test Guideline 438)

Respiratory or skin sensitization
Local lymph node assay (LLNA) - Mouse
Result: negative
(OECD Test Guideline 429)

Germ cell mutagenicity
Test Type: Ames test
Test system: Escherichia coli/Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative

Test Type: In vivo micronucleus test
Species: Mouse
Cell type: Red blood cells (erythrocytes)
Application Route: Oral
Method: OPPTS 870.5395
Result: negative

Test Type: dominant lethal test
Species: Rat

Application Route: Oral

Result: negative
Remarks: (ECHA)

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Carcinogenicity
Presumed to have carcinogenic potential for humans

IARC: 1 - Group 1: Carcinogenic to humans (1,2-Dichloropropane)

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Gavage - 103 Weeks - NOAEL (No observed adverse effect level) - 62 - 125 mg/kg - LOAEL (Lowest observed adverse effect level) - 125 - 250 mg/kg
Remarks: (ECHA)

RTECS: TX9625000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Blood -

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Pimephales promelas (fathead minnow) - 140 mg/l - 96 h (US-EPA)
Toxicity to daphnia and other aquatic invertebrates	semi-static test EC50 - Daphnia magna (Water flea) - 2.7 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	static test NOEC - Pseudokirchneriella subcapitata - 7.95 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to fish(Chronic toxicity)	NOEC - Pimephales promelas (fathead minnow) - 6 - 11 mg/l - 28 Days (US-EPA)
Toxicity to daphnia and other aquatic invertebrates(Chronic	NOEC - Daphnia magna (Water flea) - 8.3 mg/l - 21 d (US-EPA)

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toxicity)

12.2 Persistence and degradability

Biodegradability aerobic - Exposure time 28 d
Result: 11.7 % - Not readily biodegradable.
(OECD Test Guideline 301D)

12.3 Bioaccumulative potential

Bioaccumulation Cyprinus carpio (Carp) - 42 d
(1,2-Dichloropropane)

Bioconcentration factor (BCF): 0.5 - 7
(OECD Test Guideline 305C)

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

SECTION 14: Transport information

DOT (US)

UN number: 1279 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloropropane
Reportable Quantity (RQ): 1000 lbs

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operates as MilliporeSigma in the US and Canada

Poison Inhalation Hazard: No

IMDG
UN number: 1279 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: 1,2-DICHLOROPROPANE

IATA
UN number: 1279 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloropropane

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
1,2-Dichloropropane	78-87-5	2018-04-24

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,2-Dichloropropane	78-87-5	2018-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,2-Dichloropropane	78-87-5	2018-04-24

California Prop. 65 Components

, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.1,2-Dichloropropane	CAS-No. 78-87-5	Revision Date 2007-09-28

SECTION 16: Other information

Further information
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The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
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Version: 8.5 Revision Date: 12/21/2023 Print Date: 08/10/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 3.9
Revision Date 05/23/2016
Print Date 06/21/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : *p*-Xylene

Product Number : 95680
Brand : Sigma-Aldrich
Index-No. : 601-022-00-9

CAS-No. : 106-42-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 3), H226
Acute toxicity, Inhalation (Category 4), H332
Acute toxicity, Dermal (Category 4), H312
Skin irritation (Category 2), H315
Acute aquatic toxicity (Category 2), H401

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H226 Flammable liquid and vapour.
H312 + H332 Harmful in contact with skin or if inhaled
H315 Causes skin irritation.
H401 Toxic to aquatic life.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.

P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312	Call a POISON CENTER/doctor if you feel unwell.
P322	Specific measures (see supplemental first aid instructions on this label).
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : 1,4-Dimethylbenzene

Formula : C_8H_{10}

Molecular weight : 106.17 g/mol

CAS-No. : 106-42-3

EC-No. : 203-396-5

Index-No. : 601-022-00-9

Hazardous components

Component	Classification	Concentration
p-Xylene		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Aquatic Acute 2; H226, H312 + H332, H315, H401	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
p-Xylene	106-42-3	TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye & Upper Respiratory Tract irritation		

		Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Eye & Upper Respiratory Tract irritation Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		ST	150.000000 ppm 655.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100.000000 ppm 435.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100.000000 ppm 435.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		
		TWA	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	150 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Eye irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		

		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
p-Xylene	106-42-3	Methylhippuric acids	1.5g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
		Methylhippuric acids	1,500.0000 mg/g	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 30 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	13.0 °C (55.4 °F)
f)	Initial boiling point and boiling range	137.0 - 138.0 °C (278.6 - 280.4 °F)
g)	Flash point	25.0 °C (77.0 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 7 %(V) Lower explosion limit: 1.1 %(V)
k)	Vapour pressure	21.3 hPa (16.0 mmHg) at 37.7 °C (99.9 °F) 12.0 hPa (9.0 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	0.86 g/cm3
n)	Water solubility	0.2 g/l
o)	Partition coefficient: n-octanol/water	log Pow: 3.15
p)	Auto-ignition temperature	529.0 °C (984.2 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	28.3 mN/m at 20.0 °C (68.0 °F)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 5,000 mg/kg

LD50 Oral - Rat - male - 3,523 mg/kg

LC50 Inhalation - Rat - 4 h - 4550 ppm
Remarks: Lungs, Thorax, or Respiration:Chronic pulmonary edema. Liver:Other changes. Blood:Changes in cell count (unspecified).

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Moderate skin irritation - 4 h

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC:	3 - Group 3: Not classifiable as to its carcinogenicity to humans (p-Xylene)
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

May cause reproductive disorders.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: ZE2625000

narcosis, Lung irritation, chest pain, pulmonary edema, Central nervous system depression, Gastrointestinal disturbance, Liver injury may occur., Kidney injury may occur., Blood disorders

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 2.60 mg/l - 96 h
	LC50 - Carassius auratus (goldfish) - 18.00 mg/l - 24 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 35.50 - 63.10 mg/l - 48 h
Toxicity to algae	EC50 - Pseudokirchneriella subcapitata (green algae) - 3.20 - 4.40 mg/l - 72 h

12.2 Persistence and degradability

Biodegradability Result: 87.8 % - Readily biodegradable

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1307 Class: 3 Packing group: III
Proper shipping name: Xylenes
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

IMDG

UN number: 1307 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: XYLENES

IATA

UN number: 1307 Class: 3 Packing group: III
Proper shipping name: Xylenes

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
p-Xylene	106-42-3	2007-07-01

SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.
H312	Harmful in contact with skin.
H312 + H332	Harmful in contact with skin or if inhaled
H315	Causes skin irritation.
H332	Harmful if inhaled.

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	1
Fire Hazard:	3
Reactivity Hazard:	0

Further information
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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.9 Revision Date: 05/23/2016 Print Date: 06/21/2016

SAFETY DATA SHEET

Creation Date 01-Jul-2010 **Revision Date** 10-Feb-2015 **Revision Number** 1

1. Identification

Product Name **Pyrene**

Cat No. : **AC180830000; AC180830250; AC180831000; AC180835000**

Synonyms Benzo[def]phenanthrene

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Liver.	

Label Elements

Signal Word
Warning

Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause drowsiness or dizziness
May cause damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Wear protective gloves/protective clothing/eye protection/face protection
Use only outdoors or in a well-ventilated area
Do not breathe dust/fume/gas/mist/vapors/spray
Wash face, hands and any exposed skin thoroughly after handling
Do not get in eyes, on skin, or on clothing
Response
Get medical attention/advice if you feel unwell
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation occurs: Get medical advice/attention
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Storage
Store in a well-ventilated place. Keep container tightly closed
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
Pyrene	129-00-0	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion Do not induce vomiting. Obtain medical attention.

Most important symptoms/effects No information available.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable Extinguishing Media No information available

Flash Point	210 °C / 410 °F
Method -	No information available
Autoignition Temperature	No information available
Explosion Limits	
Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Carbon monoxide (CO) Carbon dioxide (CO_2)
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
2	1	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment. Avoid dust formation.
Environmental Precautions	Should not be released into the environment. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.
Methods for Containment and Clean Up	Sweep up or vacuum up spillage and collect in suitable container for disposal. Avoid dust formation.

7. Handling and storage

Handling	Ensure adequate ventilation. Wear personal protective equipment. Avoid contact with skin, eyes and clothing. Avoid dust formation. Avoid breathing dust/fume/gas/mist/vapours/spray. Avoid ingestion and inhalation.
Storage	Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines	This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.
Engineering Measures	Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin and body protection	Wear appropriate protective gloves and clothing to prevent skin exposure.
Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	Yellow
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	148 - 152 °C / 298 - 306 °F
Boiling Point/Range	393 °C / 739.4 °F @ 760 mmHg
Flash Point	210 °C / 410 °F
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	No information available
Relative Density	No information available
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C16 H10
Molecular Weight	202.25

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Avoid dust formation.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Pyrene	2700 mg/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Pyrene	129-00-0	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)
STOT - repeated exposure Liver

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects Tumorigenic effects have been reported in experimental animals. The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Do not empty into drains. Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Pyrene	Not listed	Oncorhynchus mykiss: LC50 > 2mg/L 96h	Not listed	EC50 48h 1.8 mg/L EC50 48h 0.002-0.003 mg/L

Persistence and Degradability No information available
Bioaccumulation/ Accumulation No information available.

Mobility .

Component	log Pow
Pyrene	4.88

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN3077
Proper Shipping Name Environmentally hazardous substance, solid, n.o.s
Proper technical name Pyrene
Hazard Class 9
Packing Group III

TDG

UN-No UN3077
Proper Shipping Name Environmentally hazardous substance, solid, n.o.s.
Hazard Class 9
Packing Group III

IATA

UN-No	UN3077
Proper Shipping Name	Environmentally hazardous substance, solid, n.o.s
Hazard Class	9
Packing Group	III

IMDG/IMO

UN-No	UN3077
Proper Shipping Name	Environmentally hazardous substance, solid, n.o.s
Hazard Class	9
Packing Group	III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Pyrene	X	X	-	204-927-3	-		X	X	X	X	-

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Pyrene	-	-	X	X

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Pyrene	5000 lb	5000 lb

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Pyrene	X	X	X	X	-

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

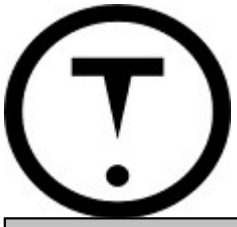
U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class D2B Toxic materials



16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 01-Jul-2010
Revision Date 10-Feb-2015
Print Date 10-Feb-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

SAFETY DATA SHEET

Version 6.7
Revision Date 10/27/2023
Print Date 07/13/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : *sec*-Butylbenzene

Product Number : B90408
Brand : Aldrich
CAS-No. : 135-98-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 3), H226
Acute toxicity, Oral (Category 4), H302
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



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Signal Word	Warning
Hazard statement(s)	
H226	Flammable liquid and vapor.
H302	Harmful if swallowed.
H410	Very toxic to aquatic life with long lasting effects.
Precautionary statement(s)	
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	2-Phenylbutane
Formula	:	$C_{10}H_{14}$
Molecular weight	:	134.22 g/mol
CAS-No.	:	135-98-8
EC-No.	:	205-227-0

Component	Classification	Concentration
sec-Butylbenzene		
	Flam. Liq. 3; Acute Tox. 4; Aquatic Acute 1; Aquatic Chronic 1; H226, H302, H400, H410 M-Factor - Aquatic Acute: 1	<= 100 %

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For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2) Foam Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air at elevated temperatures.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters

In the event of fire, wear self-contained breathing apparatus.

5.4 Further information

Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

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SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

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8.2 Exposure controls

Appropriate engineering controls

Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.

Personal protective equipment

Eye/face protection

Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Flame retardant antistatic protective clothing.

Respiratory protection

Recommended Filter type: Filter type ABEK
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure

Do not let product enter drains. Risk of explosion.

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SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Color: colorless
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 75.5 °C (167.9 °F) - lit.
f)	Initial boiling point and boiling range	173 - 174 °C 343 - 345 °F - lit.
g)	Flash point	52.0 °C (125.6 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Lower explosion limit: 0.8 %(V)
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	0.863 g/mL at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	418.0 °C (784.4 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

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SECTION 10: Stability and reactivity

10.1 Reactivity
Vapor/air-mixtures are explosive at intense warming.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Violent reactions possible with:
Strong oxidizing agents

10.4 Conditions to avoid
Heating.

10.5 Incompatible materials
various plastics

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 1,926 mg/kg
Remarks: (RTECS)
Inhalation: No data available
LD50 Dermal - Rabbit - > 13,760 mg/kg
Remarks: (RTECS)
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Mild eye irritant - 24 h
Remarks: (RTECS)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation - 24 h
Remarks: (RTECS)

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is

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identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: CY9100000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After absorption:

Headache
Nausea
narcosis

Other dangerous properties can not be excluded.

Handle in accordance with good industrial hygiene and safety practice.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	semi-static test EC50 - Daphnia magna (Water flea) - 0.6 mg/l - 48 h (OECD Test Guideline 202) Remarks: (in analogy to similar products)
Toxicity to algae	static test ErC50 - Pseudokirchneriella subcapitata (green algae) - 0.42 mg/l - 72 h (OECD Test Guideline 201) Remarks: (in analogy to similar products)
	static test NOEC - Pseudokirchneriella subcapitata (green algae) - 0.26 mg/l - 72 h (OECD Test Guideline 201) Remarks: (in analogy to similar products)

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12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
Discharge into the environment must be avoided.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 2709 Class: 3 Packing group: III
Proper shipping name: Butyl benzenes
Reportable Quantity (RQ):
Marine pollutant: yes Poison Inhalation Hazard: No

IMDG
UN number: 2709 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: BUTYLBENZENES
Marine pollutant : yes
Marine pollutant : yes

IATA
UN number: 2709 Class: 3 Packing group: III
Proper shipping name: Butylbenzenes

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SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
sec-Butylbenzene	135-98-8	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
sec-Butylbenzene	135-98-8	1993-04-24

SECTION 16: Other information

Further information
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact misbranding@sial.com.

Version: 6.7 Revision Date: 10/27/2023 Print Date: 07/13/2024

The life science business of Merck KGaA, Darmstadt, Germany
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SAFETY DATA SHEET

Revision Date 10-Feb-2015 **Revision Number** 1

1. Identification

Product Name **Selenium**

Cat No. : **AC419270000; AC419271000; AC419275000**

Synonyms None

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute oral toxicity	Category 3
Acute Inhalation Toxicity - Dusts and Mists	Category 3
Specific target organ toxicity - (repeated exposure)	Category 2

Label Elements

Signal Word
Danger

Hazard Statements
Toxic if swallowed
Toxic if inhaled
May cause damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention

Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Do not breathe dust/fume/gas/mist/vapors/spray

Response

Get medical attention/advice if you feel unwell

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician

Ingestion

IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Rinse mouth

Storage

Store locked up
Store in a well-ventilated place. Keep container tightly closed

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

May cause long lasting harmful effects to aquatic life

3. Composition / information on ingredients

Component	CAS-No	Weight %
Selenium	7782-49-2	> 99.5

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes.

Inhalation Remove from exposure, lie down. Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Immediate medical attention is required.

Ingestion Do not induce vomiting. Never give anything by mouth to an unconscious person. Drink plenty of water. Call a physician immediately. If possible drink milk afterwards.

Most important symptoms/effects No information available.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. chemical foam.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical

Vapors may form explosive mixtures with air.

Hazardous Combustion Products
None known
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
3	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Sweep up or vacuum up spillage and collect in suitable container for disposal.

7. Handling and storage

Handling Avoid contact with skin and eyes. Do not breathe dust. Do not breathe vapors or spray mist. Use only in area provided with appropriate exhaust ventilation.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep under nitrogen.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Selenium	TWA: 0.2 mg/m³	(Vacated) TWA: 0.2 mg/m³	IDLH: 1 mg/m³ TWA: 0.2 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Selenium	TWA: 0.2 mg/m³	TWA: 0.2 mg/m³	TWA: 0.2 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection A NIOSH/MSHA approved air purifying dust or mist respirator or European Standard EN 149.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid
Appearance	Grey
Odor	No information available
Odor Threshold	No information available
pH	No information available
Melting Point/Range	217 - 222 °C / 422.6 - 431.6 °F
Boiling Point/Range	685 °C / 1265 °F
Flash Point	No information available
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	1 mmHg @ 345 °C
Vapor Density	No information available
Relative Density	4.810
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	Se
Molecular Weight	78.96

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Acids, Strong oxidizing agents, Fluorine, oxygen, Metals

Hazardous Decomposition Products None under normal use conditions

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Selenium	6700 mg/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Selenium	7782-49-2	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available
Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity
Do not empty into drains.

Persistence and Degradability No information available
Bioaccumulation/ Accumulation No information available.

Mobility No information available.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT
- **UN-No** UN3283
- **Hazard Class** 6.1
- **Packing Group** III

TDG
- **UN-No** UN3283
- **Hazard Class** 6.1
- **Packing Group** III

IATA
- **UN-No** 3283
- **Proper Shipping Name** SELENIUM COMPOUND, SOLID, N.O.S.
- **Hazard Class** 6.1
- **Packing Group** III

IMDG/IMO
- **UN-No** 3283
- **Proper Shipping Name** SELENIUM COMPOUND, SOLID, N.O.S.
- **Hazard Class** 6.1
- **Packing Group** III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Selenium	X	X	-	231-957-4	-		X	-	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Selenium	7782-49-2	> 99.5	1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Selenium	-	-	X	X

Clean Air Act Not applicable

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Selenium	X		-

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Selenium	100 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Selenium	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class D1A Very toxic materials
D2B Toxic materials



16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Revision Date 10-Feb-2015
Print Date 10-Feb-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

SAFETY DATA SHEET

Version 4.6
Revision Date 12/02/2015
Print Date 02/09/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Silver

Product Number : 327093
Brand : Aldrich

CAS-No. : 7440-22-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Not a hazardous substance or mixture.

2.2 GHS Label elements, including precautionary statements

Not a hazardous substance or mixture.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : Ag
Molecular weight : 107.87 g/mol
CAS-No. : 7440-22-4
EC-No. : 231-131-3

Hazardous components

Component	Classification	Concentration
Silver		
		<= 100 %

4. FIRST AID MEASURES

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Silver/silver oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions
No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Air sensitive. Store under inert gas. Keep in a dry place.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Silver	7440-22-4	TWA	0.010000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.010000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Argyria		
		TWA	0.010000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.010000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.010000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Argyria		
		TWA	0.010000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Argyria		
		TWA	0.01 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants

8.2 Exposure controls

Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
No special environmental precautions required.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 960 °C (1,760 °F) - lit.
f)	Initial boiling point and boiling range	2,212 °C (4,014 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	10.49 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Oxygen, Strong acids and strong bases

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male - > 5,000 mg/kg

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

Carcinogenicity - Rat - Unreported
Tumorigenic:Tumors at site or application.

Carcinogenicity classification not possible from current data.

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

May cause argyria (a slate-gray or bluish discoloration of the skin and deep tissues due to the deposit of insoluble albuminate of silver).

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Silver)
Reportable Quantity (RQ): 1 lbs

Poison Inhalation Hazard: No

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Silver	7440-22-4	1993-04-24

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Silver	7440-22-4	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date

Silver	7440-22-4	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Silver	7440-22-4	1993-04-24

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.6 Revision Date: 12/02/2015 Print Date: 02/09/2016

Fisher Scientific

Part of Thermo Fisher Scientific

SAFETY DATA SHEET

Revision Date 10-Feb-2015 **Revision Number** 1

1. Identification

Product Name **2-(2,4,5-Trichlorophenoxy)propionic acid**

Cat No. : **AC171700000; AC171700050**

Synonyms Silvex

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute oral toxicity	Category 4
Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Carcinogenicity	Category 2

Label Elements

Signal Word
Warning

Hazard Statements
Harmful if swallowed
Causes skin irritation
Causes serious eye irritation
Suspected of causing cancer



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Wear eye/face protection
Response
IF exposed or concerned: Get medical attention/advice
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Storage
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
Silvex (2,4,5-TP)	93-72-1	97

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Obtain medical attention.

Inhalation Remove from exposure, lie down. Move to fresh air. Obtain medical attention.

Ingestion Clean mouth with water. Get medical attention.

Most important symptoms/effects No information available.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. chemical foam.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Hydrogen chloride gas Carbon monoxide (CO) Carbon dioxide (CO_2)
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Avoid dust formation. Sweep up or vacuum up spillage and collect in suitable container for disposal. Do not let this chemical enter the environment.

7. Handling and storage

Handling Avoid contact with skin and eyes. Do not breathe dust. Do not breathe vapors or spray mist. Do not ingest.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid
Appearance	Beige
Odor	Slight
Odor Threshold	No information available
pH	No information available
Melting Point/Range	177 - 181 °C / 350.6 - 357.8 °F
Boiling Point/Range	No information available
Flash Point	No information available
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	No information available
Relative Density	1.209
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C9 H7 Cl3 O3
Molecular Weight	269.51

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products Hydrogen chloride gas, Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization No information available.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Silvex (2,4,5-TP)	650 mg/kg (Rat)	3200 mg/kg (Rabbit)	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Silvex (2,4,5-TP)	93-72-1	Group 2B	Not listed	Not listed	X	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available
Endocrine Disruptor Information No information available

Other Adverse Effects See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity
Do not empty into drains.

Persistence and Degradability No information available
Bioaccumulation/ Accumulation No information available.

Mobility No information available.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT Not regulated
TDG Not regulated
IATA
- **UN-No** 3077
- **Proper Shipping Name** ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.*
- **Hazard Class** 9
- **Packing Group** III

IMDG/IMO
- **UN-No** 3077
- **Proper Shipping Name** ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
- **Hazard Class** 9
- **Packing Group** III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Silvex (2,4,5-TP)	-	-	-	202-271-2	-		X	X	-	-	-

Legend:
X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Silvex (2,4,5-TP)	X	100 lb	-	-

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Silvex (2,4,5-TP)	100 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Silvex (2,4,5-TP)	X	X	X	X	-

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class D1B Toxic materials
D2B Toxic materials



16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Revision Date 10-Feb-2015
Print Date 10-Feb-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) 50 UG/ML IN METHANOL

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830 and according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 18/03/2019 Revision date: : Version: 1.0

ULM-10755-S

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form : Mixtures

Product name : 1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) 50 UG/ML IN METHANOL

Product code : ULM-10755-S

1.2. Relevant identified uses of the substance or mixture and uses advised against

1.2.1. Relevant identified uses

Main use category : Professional use

Industrial/Professional use spec : For professional use only

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

Cambridge Isotope Laboratories, Inc.
50 Frontage Road
Andover, MA 01810
USA

USA: 1-800-322-1174 Int: 1-978-749-8000
cilsales@isotope.com www.isotope.com

Emergency telephone number

Emergency numbers:

Chemtrec: 1-800-424-9300 (24 hours)
International: 1-703-741-5970 (24 hours)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Flam. Liq. 2	H225
Acute Tox. 3 (Oral)	H301
Acute Tox. 3 (Dermal)	H311
Acute Tox. 3 (Inhalation:vapour)	H331
Skin Irrit. 2	H315
Eye Irrit. 2A	H319
STOT SE 1	H370

Full text of hazard classes and H-statements : see section 16

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]

F; R11
T; R39/23/24/25
Xi; R36/38

Full text of R-phrases: see section 16

GHS-US classification

Flam. Liq. 2	H225
Acute Tox. 3 (Oral)	H301
Acute Tox. 3 (Dermal)	H311
Acute Tox. 3 (Inhalation:vapour)	H331
Skin Irrit. 2	H315
Eye Irrit. 2A	H319
STOT SE 1	H370

Full text of H statements : see section 16

Adverse physicochemical, human health and environmental effects

Eyes, Kidney, Liver, Heart, Central nervous system. Highly flammable liquid and vapor. Causes damage to organs (eyes, kidneys, liver, heart, central nervous system) (if inhaled, if swallowed, in contact with skin). Toxic in contact with skin. Toxic if inhaled. Toxic if swallowed. Causes skin irritation. Causes serious eye irritation.

2.2. Label elements

Labeling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP) :



GHS02 GHS08 GHS06

Signal word (CLP) : Danger

Hazard statements (CLP) : H225 - Highly flammable liquid and vapor
H301+H311+H331 - Toxic if swallowed, in contact with skin or if inhaled
H315 - Causes skin irritation
H319 - Causes serious eye irritation
H370 - Causes damage to organs (eyes, heart, kidneys, liver, central nervous system) (in contact with skin, if inhaled, if swallowed)

Precautionary statements (CLP) : P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233 - Keep container tightly closed.
P240 - Ground/bond container and receiving equipment.
P241 - Use explosion-proof electrical, lighting, ventilating equipment
P260 - Do not breathe dust, mist, vapors, fume, gas, spray.
P264 - Wash hands, forearms and face thoroughly after handling.
P270 - Do not eat, drink or smoke when using this product.
P271 - Use only outdoors or in a well-ventilated area.

GHS-US labeling

Hazard pictograms (GHS-US) :



GHS02 GHS08 GHS06

Signal word (GHS-US) : Danger

Hazard statements (GHS-US) : H225 - Highly flammable liquid and vapor
H301+H311+H331 - Toxic if swallowed, in contact with skin or if inhaled
H315 - Causes skin irritation
H319 - Causes serious eye irritation
H370 - Causes damage to organs (eyes, kidneys, liver, heart, central nervous system) (Dermal, Inhalation, oral)

Precautionary statements (GHS-US) : P210 - Keep away from heat, open flames, sparks. - No smoking.
P233 - Keep container tightly closed.
P240 - Ground/Bond container and receiving equipment
P241 - Use explosion-proof electrical, lighting, ventilating equipment
P242 - Use only non-sparking tools.
P243 - Take precautionary measures against static discharge.
P260 - Do not breathe dust, fume, mist, gas, spray, vapors.
P261 - Avoid breathing dust, fume, gas, spray, vapors, mist.
P264 - Wash hands, forearms and face thoroughly after handling.
P270 - Do not eat, drink or smoke when using this product.
P271 - Use only outdoors or in a well-ventilated area.
P280 - Wear protective clothing, protective gloves.
P301+P310 - If swallowed: Immediately call a doctor, a POISON CENTER
P302+P352 - If on skin: Wash with plenty of water
P303+P361+P353 - If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P307+P311 - If exposed: Call a poison center/doctor

P311 - Call a doctor, a POISON CENTER
P312 - Call a doctor, a POISON CENTER if you feel unwell
P321 - Specific treatment (see Hazardous component(s) for labeling on this label)
P322 - Specific treatment (see Hazard pictograms (CLP) on this label)
P330 - Rinse mouth.
P332+P313 - If skin irritation occurs: Get medical advice/attention.
P337+P313 - If eye irritation persists: Get medical advice/attention.
P361+P364 - Take off immediately all contaminated clothing and wash it before reuse.
P362+P364 - Take off contaminated clothing and wash it before reuse.
P370+P378 - In case of fire: Use alcohol resistant foam, carbon dioxide (CO2), dry extinguishing powder to extinguish.
P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
P403+P235 - Store in a well-ventilated place. Keep cool.
P405 - Store locked up.
P501 - Dispose of contents/container to hazardous or special waste collection point, in accordance with local, regional, national and/or international regulation

2.3. Other hazards

PBT: not relevant – no registration required

SECTION 3: Composition/Information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Name	Product identifier	%	Classification according to Directive 67/548/EEC
100% METHANOL UNLABELED	(CAS-No.) 67-56-1 (EC-No.) 200-659-6 (EC Index-No.) 603-001-00-X (REACH-no) 01-2119433307-44	99.9937	F; R11 T; R39/23/24/25 Xi; R36/38
1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED)	(CAS-No.) 27619-96-1 (EC Index-No.)	0.0063	T; R25 Xn; R20 N; R51/53

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
100% METHANOL UNLABELED	(CAS-No.) 67-56-1 (EC-No.) 200-659-6 (EC Index-No.) 603-001-00-X (REACH-no) 01-2119433307-44	99.9937	Flam. Liq. 2, H225 Acute Tox. 3 (Oral), H301 Acute Tox. 3 (Dermal), H311 Acute Tox. 3 (Inhalation:vapour), H331 Skin Irrit. 2, H315 Eye Irrit. 2, H319 STOT SE 1, H370
1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED)	(CAS-No.) 27619-96-1 (EC Index-No.)	0.0063	Acute Tox. 3 (Oral), H301 Acute Tox. 4 (Inhalation), H332 Aquatic Chronic 2, H411

Name	Product identifier	%	GHS-US classification
100% METHANOL UNLABELED	(CAS-No.) 67-56-1	99.9937	Flam. Liq. 2, H225 Acute Tox. 3 (Oral), H301 Acute Tox. 3 (Dermal), H311 Acute Tox. 3 (Inhalation:vapour), H331 Skin Irrit. 2, H315 Eye Irrit. 2A, H319 STOT SE 1, H370
1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED)	(CAS-No.) 27619-96-1	0.0063	Acute Tox. 3 (Oral), H301 Acute Tox. 4 (Inhalation), H332 Aquatic Chronic 2, H411

Full text of R- and H- phrases: see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : If medical advice is needed, have product container or label at hand. Call a physician immediately. Evacuate danger area.

First-aid measures after inhalation : Remove person to fresh air and keep comfortable for breathing. If not breathing, give artificial respiration. Call a doctor.

First-aid measures after skin contact : Rinse skin with water/shower. Take immediately victim to hospital. Remove/Take off immediately all contaminated clothing. If skin irritation occurs: Get medical advice/attention.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

First-aid measures after ingestion : Do not induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth. Call a physician immediately.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/effects : Causes damage to organs (Eyes, heart, liver, kidneys, central nervous system, Skin) (in contact with skin, if inhaled, if swallowed).

Symptoms/effects after inhalation : Toxic if inhaled.

Symptoms/effects after skin contact : Toxic in contact with skin. Causes skin irritation.

Symptoms/effects after eye contact : Causes serious eye irritation.

Symptoms/effects after ingestion : Toxic if swallowed.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Dry powder. Dry sand.

Unsuitable extinguishing media : Do not use a heavy water stream.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Highly flammable liquid and vapor.

Reactivity : vapors may form flammable mixture with air. Highly flammable liquid and vapor.

5.3. Advice for firefighters

Firefighting instructions : Do not enter fire area without proper protective equipment, including respiratory protection.

Protection during firefighting : Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing. Wear recommended personal protective equipment.

Other information : Use water spray to cool exposed surfaces.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Emergency procedures : Wear respiratory protection. Do not breathe dust, mist, gas, spray, vapors, fume. Avoid contact with skin, eyes and clothing. Ventilate spillage area. Remove all sources of ignition. No open flames, no sparks, and no smoking. Ensure adequate air ventilation. Special attention should be given to low areas/pits where flammable vapors can accumulate.

6.1.2. For emergency responders

Protective equipment : Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

6.2. Environmental precautions

Prevent entry to sewers and public waters. Do not allow to enter drains or water courses. Avoid release to the environment.

6.3. Methods and material for containment and cleaning up

For containment : Dike and contain spill.

Methods for cleaning up : Take up liquid spill into absorbent material. Notify authorities if product enters sewers or public waters. This material and its container must be disposed of in a safe way, and as per local legislation.

Other information : Dispose of materials or solid residues at an authorized site.

6.4. Reference to other sections

For further information refer to section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Ground/bond container and receiving equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Flammable vapors may accumulate in the container. Use explosion-proof equipment. Wear personal protective equipment. Do not breathe dust, fume, gas, spray, vapors, mist. Do not get in eyes, on skin, or on clothing. Use only outdoors or in a well-ventilated area.

Hygiene measures : Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Ground/bond container and receiving equipment. Store in a well-ventilated place. Keep container tightly closed. Store locked up.

Storage conditions : Store at room temperature away from light and moisture.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) 50 UG/ML IN METHANOL		
Italy - Portugal - USA ACGIH	ACGIH TWA (ppm)	200.00000000 ppm Basis: USA. ACGIH Threshold Limit Values (TLV)
Italy - Portugal - USA ACGIH	ACGIH STEL (ppm)	250 ppm Basis: USA. ACGIH Threshold Limit Values (TLV)
Italy - Portugal - USA ACGIH	Remark (ACGIH)	Headache. Nausea. Dizziness. Eye damage. Substances for which there is a Biological Exposure Index or Indices (see BEI section). Danger of cutaneous absorption.
USA NIOSH	NIOSH REL (TWA) (mg/m³)	260 mg/m³ Basis: NIOSH Recommended Exposure Limits
USA NIOSH	NIOSH REL (TWA) (ppm)	200 ppm Basis: NIOSH Recommended Exposure Limits
USA NIOSH	NIOSH REL (STEL) (mg/m³)	325 mg/m³ Basis: NIOSH Recommended Exposure Limits
USA NIOSH	NIOSH REL (STEL) (ppm)	250 ppm Basis: NIOSH Recommended Exposure Limits
USA NIOSH	Remark (NIOSH)	Potential for dermal absorption.
USA OSHA	OSHA PEL (TWA) (mg/m³)	260 mg/m³ Basis: USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants - 1910.1000. California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	OSHA PEL (TWA) (ppm)	200 ppm Basis: USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants - 1910.1000. California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	OSHA PEL (STEL) (mg/m³)	325 mg/m³ Basis: USA. OSHA - Table Z-1 Limits for Air Contaminants - 1910.1000. California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	OSHA PEL (STEL) (ppm)	250 ppm Basis: USA. OSHA - Table Z-1 Limits for Air Contaminants - 1910.1000. California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	OSHA PEL (Ceiling) (ppm)	1000 ppm California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	Remark (OSHA)	The value in mg/m3 is approximate. Skin notation.

100% METHANOL UNLABELED (67-56-1)		
Italy - Portugal - USA ACGIH	ACGIH TWA (ppm)	200.00000000 ppm Basis: USA. ACGIH Threshold Limit Values (TLV)
Italy - Portugal - USA ACGIH	ACGIH STEL (ppm)	250 ppm Basis: USA. ACGIH Threshold Limit Values (TLV)
Italy - Portugal - USA ACGIH	Remark (ACGIH)	Headache. Nausea. Dizziness. Eye damage. Substances for which there is a Biological Exposure Index or Indices (see BEI section). Danger of cutaneous absorption.
USA NIOSH	NIOSH REL (TWA) (mg/m³)	260 mg/m³ Basis: NIOSH Recommended Exposure Limits

100% METHANOL UNLABELED (67-56-1)		
USA NIOSH	NIOSH REL (TWA) (ppm)	200 ppm Basis: NIOSH Recommended Exposure Limits
USA NIOSH	NIOSH REL (STEL) (mg/m³)	325 mg/m³ Basis: NIOSH Recommended Exposure Limits
USA NIOSH	NIOSH REL (STEL) (ppm)	250 ppm Basis: NIOSH Recommended Exposure Limits
USA NIOSH	Remark (NIOSH)	Potential for dermal absorption.
USA OSHA	OSHA PEL (TWA) (mg/m³)	260 mg/m³ Basis: USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants - 1910.1000. California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	OSHA PEL (TWA) (ppm)	200 ppm Basis: USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants - 1910.1000. California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	OSHA PEL (STEL) (mg/m³)	325 mg/m³ Basis: USA. OSHA - Table Z-1 Limits for Air Contaminants - 1910.1000. California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	OSHA PEL (STEL) (ppm)	250 ppm Basis: USA. OSHA - Table Z-1 Limits for Air Contaminants - 1910.1000. California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	OSHA PEL (Ceiling) (ppm)	1000 ppm California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA OSHA	Remark (OSHA)	The value in mg/m3 is approximate. Skin notation.

1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) 50 UG/ML IN METHANOL	
DNEL/DMEL (Workers)	
Acute - systemic effects, dermal	40 mg/kg bodyweight/day
Acute - systemic effects, inhalation	260 mg/m³
Acute - local effects, dermal	260 mg/cm²
Long-term - systemic effects, dermal	40 mg/kg bodyweight/day
Long-term - local effects, dermal	260 mg/cm²
Long-term - local effects, inhalation	260 mg/m³
DNEL/DMEL (General population)	
Acute - systemic effects, dermal	8 mg/kg body weight
Acute - systemic effects, inhalation	50 mg/m³
Acute - systemic effects, oral	8 mg/kg body weight
Acute - local effects, inhalation	50 mg/m³
Long-term - systemic effects,oral	8 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	50 mg/m³
Long-term - systemic effects, dermal	8 mg/kg bodyweight/day
Long-term - local effects, inhalation	50 mg/m³
PNEC (Water)	
PNEC aqua (freshwater)	154 mg/l
PNEC aqua (marine water)	15.4 mg/l
PNEC (Sediment)	
PNEC sediment (freshwater)	570.4 mg/kg dwt
PNEC (Soil)	
PNEC soil	23.5 mg/kg dwt
PNEC (STP)	
PNEC sewage treatment plant	100 mg/kg

8.2. Exposure controls

Appropriate engineering controls : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.

Personal protective equipment	:	Gloves. Protective clothing. Protective goggles. Self-contained breathing apparatus.



Materials for protective clothing	:	Wear suitable protective clothing and gloves.
Hand protection	:	Wear suitable protective clothing and gloves.
Eye protection	:	Wear eye protection. Chemical goggles or face shield with safety glasses.
Skin and body protection	:	Wear suitable protective clothing, gloves and eye/face protection.
Respiratory protection	:	In case of inadequate ventilation wear respiratory protection. Approved supplied air respirator.
Environmental exposure controls	:	Avoid release to the environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

The properties listed below are for the solvent, the main component of this mixture.

Physical state	:	Liquid
Appearance	:	Liquid
Molecular mass	:	32.04 g/mol
Color	:	Colorless
Odor	:	Pungent
Odor threshold	:	No data available
pH	:	No data available
Relative evaporation rate (butyl acetate=1)	:	No data available
Melting point	:	-98 °C (-144 °F)
Freezing point	:	No data available
Boiling point	:	64.7 °C (148.5 °F)
Flash point	:	9.7 °C (49.5 °F) - closed cup
Auto-ignition temperature	:	455 °C (851 °F) at 1,013 hPa (760 mmHg)
Decomposition temperature	:	No data available
Flammability (solid, gas)	:	No data available
Vapor pressure	:	130.3 hPa (97.7 mmHg) at 20 °C (68 °F); 169.27 hPa (126.96 mmHg) at 25 °C (77 °F)
Vapor pressure at 50 °C	:	546.6 hPa (410 mmHg) at 50 °C (122 °F)
Relative vapor density at 20 °C	:	1.11
Relative density	:	No data available
Specific gravity / density	:	0.791 g/ml at 25 °C (77 °F)
Solubility	:	Water: Completely miscible
Log Pow	:	-0.77
Log Kow	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available
Explosive properties	:	Product is not explosive.
Oxidizing properties	:	Non oxidizing material according to EC criteria.
Explosion limits	:	6 - 36 % (V)

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

vapors may form flammable mixture with air. Highly flammable liquid and vapor.

10.2. Chemical stability

See storage and expiration date on CoA.

10.3. Possibility of hazardous reactions

No dangerous reactions known under normal conditions of use.

10.4. Conditions to avoid

Avoid contact with hot surfaces. Heat. No flames, no sparks. Eliminate all sources of ignition.

10.5. Incompatible materials

Acid anhydrides. Acid chlorides. Oxidizing agent. Alkali Metal Amides. Reducing agents. Acids.

10.6. Hazardous decomposition products

Carbon oxides (CO, CO2).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Oral: Toxic if swallowed. Dermal: Toxic in contact with skin. Inhalation:vapour: Toxic if inhaled.

1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) 50 UG/ML IN METHANOL	
LD50 oral rat	1187 - 2769 mg/kg
LD50 dermal rabbit	17100 mg/kg
LC50 inhalation rat (mg/l)	128.2 mg/l/4h ; 87.6 mg/l - 6 h
ATE CLP (oral)	100.000 mg/kg body weight
ATE CLP (dermal)	300.000 mg/kg body weight
ATE CLP (vapors)	3.000 mg/l/4h
ATE CLP (dust, mist)	128.200 mg/l/4h
LDLO, oral, human	143 mg/kg Remarks: Lungs, Thorax, or Respiration: Dyspnea. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) (27619-96-1)	
ATE CLP (oral)	100.000 mg/kg body weight
ATE CLP (gases)	4500.000 ppmV/4h
ATE CLP (vapors)	11.000 mg/l/4h
ATE CLP (dust, mist)	1.500 mg/l/4h

100% METHANOL UNLABELED (67-56-1)	
LD50 oral rat	1187 - 2769 mg/kg
LD50 dermal rabbit	17100 mg/kg
LC50 inhalation rat (mg/l)	128.2 mg/l/4h ; 87.6 mg/l - 6 h
ATE CLP (oral)	100.000 mg/kg body weight
ATE CLP (dermal)	300.000 mg/kg body weight
ATE CLP (vapors)	3.000 mg/l/4h
ATE CLP (dust, mist)	128.200 mg/l/4h
LDLO, oral, human	143 mg/kg Remarks: Lungs, Thorax, or Respiration: Dyspnea. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Skin corrosion/irritation : Skin. rabbit. Result: No skin irritation

Serious eye damage/irritation : Eyes. rabbit. Result: No eye irritation

Respiratory or skin sensitization : Maximisation Test . Guinea pig. Did not cause sensitization. (OECD 406 method)

Germ cell mutagenicity : AMES test : S. tymphimurium. Result: negative. fibroblast. Result: Negative. Mutation in mammalian somatic cells. Mutagenicity (in vivo mammalian bone-marrow cytogenetic test, chromosomal analysis) - Mouse - male and female Result: negative. Mouse - male and female. Result: Negative

Carcinogenicity : Not classified

Reproductive toxicity : Damage to fetus not classifiable. Fertility classification not possible from current data.

Specific target organ toxicity – single exposure : Causes damage to organs through prolonged or repeated exposure

Causes damage to organs

Specific target organ toxicity – repeated exposure : The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

No data available

Aspiration hazard : No aspiration toxicity classification.

Potential Adverse human health effects and symptoms : This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product. Effects due to Ingestion may include: Headache. Dizziness. Drowsiness. metabolic acidosis. Coma. May be fatal if swallowed and enters airways. If swallowed there is a risk of blindness. Effects on humans. stomach.

Symptoms/effects after inhalation : Toxic if inhaled.

Symptoms/effects after skin contact : Toxic in contact with skin. Causes skin irritation.

Symptoms/effects after eye contact : Causes serious eye irritation.

Symptoms/effects after ingestion : Toxic if swallowed.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : The product is not considered harmful to aquatic organisms or to cause long-term adverse effects in the environment.

1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) 50 UG/ML IN METHANOL	
LC50 fish 1	15400 mg/l mortality LC50 - Lepomis machrochirus (Bluegill) - 96 h
EC50 Daphnia 1	> 10000 mg/l Daphnia magna (Water flea) - 48 h
EC50 Daphnia 2	22000 mg/l Growth inhibition EC50 - Scenedesmus capricornutum (fresh water algae) - 96 h
NOEC (acute)	7900 mg/l Oryzias latipes - 200 h

100% METHANOL UNLABELED (67-56-1)	
LC50 fish 1	15400 mg/l mortality LC50 - Lepomis machrochirus (Bluegill) - 96 h
EC50 Daphnia 1	> 10000 mg/l Daphnia magna (Water flea) - 48 h
EC50 Daphnia 2	22000 mg/l Growth inhibition EC50 - Scenedesmus capricornutum (fresh water algae) - 96 h
NOEC (acute)	7900 mg/l Oryzias latipes - 200 h

12.2. Persistence and degradability

1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) 50 UG/ML IN METHANOL	
Biochemical oxygen demand (BOD)	600 - 1200 mg/g
Chemical oxygen demand (COD)	1420 mg/g
ThOD	1500 mg/g
Biodegradation	72 % - rapidly biodegradable aerobic - Exposure time 5 d

100% METHANOL UNLABELED (67-56-1)	
Biochemical oxygen demand (BOD)	600 - 1200 mg/g
Chemical oxygen demand (COD)	1420 mg/g
ThOD	1500 mg/g
Biodegradation	72 % - rapidly biodegradable aerobic - Exposure time 5 d

12.3. Bioaccumulative potential

1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) 50 UG/ML IN METHANOL	
BCF fish 1	5 mg/l Cyprinus carpio (Carp) - 72 d at 20 °C
Bioconcentration factor (BCF REACH)	1
Log Pow	-0.77

100% METHANOL UNLABELED (67-56-1)	
BCF fish 1	5 mg/l Cyprinus carpio (Carp) - 72 d at 20 °C
Bioconcentration factor (BCF REACH)	1
Log Pow	-0.77

12.4. Mobility in soil

1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) 50 UG/ML IN METHANOL	
Ecology - soil	Not degradable in the soil.

100% METHANOL UNLABELED (67-56-1)	
Ecology - soil	Not degradable in the soil.

12.5. Results of PBT and vPvB assessment

1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) 50 UG/ML IN METHANOL
PBT: not relevant – no registration required

100% METHANOL UNLABELED (67-56-1)
PBT: not relevant – no registration required

12.6. Other adverse effects

Other adverse effects : Avoid release to the environment.

Other information : Stability in water: at 19 °C - (83 - 91%) - 72 h. Remarks: Hydrolyses on contact with water. Hydrolyses readily.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Regional legislation (waste) : Waste materials should be disposed of under conditions which meet Federal, State, and local environmental control regulations.

Product/Packaging disposal recommendations : Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Ecology - waste materials : Dispose of as unused product.

SECTION 14: Transport information

In accordance with ADR / RID / IMDG / IATA / ADN

14.1. UN number

UN-No.(DOT) : 1230

DOT NA no. UN1230

14.2. UN proper shipping name

Proper Shipping Name (DOT) : Methanol

Class (DOT) : 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120

Hazard labels (DOT) : 3 - Flammable liquid
6.1 - Poison



DOT Symbols : + - Fixes (cannot be altered) proper shipping name, hazard class, and packing group,I - Proper shipping name appropriate for international and domestic transportation

Packing group (DOT) : II - Medium Danger

DOT Special Provisions (49 CFR 172.102) : IB2 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1). Additional Requirement: Only liquids with a vapor pressure less than or equal to 110 kPa at 50 C (1.1 bar at 122 F), or 130 kPa at 55 C (1.3 bar at 131 F) are authorized.
T7 - 4 178.274(d)(2) Normal..... 178.275(d)(3)
TP2 - a. The maximum degree of filling must not exceed the degree of filling determined by the following: (image) Where: tr is the maximum mean bulk temperature during transport, tf is the temperature in degrees celsius of the liquid during filling, and a is the mean coefficient of cubical expansion of the liquid between the mean temperature of the liquid during filling (tf) and the maximum mean bulk temperature during transportation (tr) both in degrees celsius. b. For liquids transported under ambient conditions may be calculated using the formula: (image) Where: d15 and d50 are the densities (in units of mass per unit volume) of the liquid at 15 C (59 F) and 50 C (122 F), respectively.

DOT Packaging Exceptions (49 CFR 173.xxx) : 150

DOT Packaging Non Bulk (49 CFR 173.xxx) : 202

DOT Packaging Bulk (49 CFR 173.xxx) : 242

DOT RQ : 5000 lbs

Marine pollutant : No

14.3. Additional information

Emergency Response Guide (ERG) Number : 131

Other information : No supplementary information available.

Overland transport

Packing group (ADR) : II

Class (ADR) : 3 - Flammable liquid

Hazard identification number (Kemler No.) : 336

Classification code (ADR) : FT1

Hazard labels (ADR)	:	3 - Flammable liquids 6.1 - Toxic substances



Orange plates	:	336 1230
Tunnel restriction code (ADR)	:	D/E
Limited quantities (ADR)		1l
Excepted quantities (ADR)	:	E2

Transport by sea

DOT Vessel Stowage Location	:	B - (i) The material may be stowed ''on deck'' or ''under deck'' on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length; and (ii) ''On deck only'' on passenger vessels in which the number of passengers specified in paragraph (k)(2)(i) of this section is exceeded.
DOT Vessel Stowage Other	:	40 - Stow ''clear of living quarters''
MFAG-No	:	131

Air transport

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)	:	1 L
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)	:	60 L
Civil Aeronautics Law	:	Flammable liquids

14.4. Environmental hazards

Other information : No supplementary information available.

14.5. Special precautions for user

14.6. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

SECTION 15: Regulatory information

15.1. US Federal regulations

1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) 50 UG/ML IN METHANOL	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
CERCLA RQ	5000 lb
SARA Section 302 Threshold Planning Quantity (TPQ)	Not subject to reporting requirements of the United States SARA Section 302.
SARA Section 311/312 Hazard Classes	Fire hazard Immediate (acute) health hazard Delayed (chronic) health hazard
SARA Section 313 - Emission Reporting	Subject to reporting requirements of United States SARA Section 313

1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) **(27619-96-1)**	
SARA Section 302 Threshold Planning Quantity (TPQ)	Not subject to reporting requirements of the United States SARA Section 302.
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard
SARA Section 313 - Emission Reporting	Not subject to reporting requirements of the United States SARA Section 313.

100% METHANOL UNLABELED (67-56-1)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
CERCLA RQ	5000 lb
SARA Section 302 Threshold Planning Quantity (TPQ)	Not subject to reporting requirements of the United States SARA Section 302.

100% METHANOL UNLABELED (67-56-1)	
SARA Section 311/312 Hazard Classes	Fire hazard Immediate (acute) health hazard Delayed (chronic) health hazard
SARA Section 313 - Emission Reporting	Subject to reporting requirements of United States SARA Section 313

15.2. International regulations

CANADA

1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) 50 UG/ML IN METHANOL
Listed on the Canadian DSL (Domestic Substances List)

100% METHANOL UNLABELED (67-56-1)
Listed on the Canadian DSL (Domestic Substances List)

15.2.1. National regulations

No additional information available

15.3. US State regulations

1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) 50 UG/ML IN METHANOL**()**	
U.S. - California - Proposition 65 - Carcinogens List	No
U.S. - California - Proposition 65 - Developmental Toxicity	Yes
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No
State or local regulations	U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Acceptable Ambient Concentrations U.S. - Massachusetts - Right To Know List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - New York - Reporting of Releases Part 597 - List of Hazardous Substances

1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) **(27619-96-1)**				
U.S. - California - Proposition 65 - Carcinogens List	U.S. - California - Proposition 65 - Developmental Toxicity	U.S. - California - Proposition 65 - Reproductive Toxicity - Female	U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No significant risk level (NSRL)
No	No	No	No	

100% METHANOL UNLABELED (67-56-1)				
U.S. - California - Proposition 65 - Carcinogens List	U.S. - California - Proposition 65 - Developmental Toxicity	U.S. - California - Proposition 65 - Reproductive Toxicity - Female	U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No significant risk level (NSRL)
No	Yes	No	No	

1H,1H,2H,2H-PERFLUORODECANE SULFONATE (8:2 FTS), SODIUM SALT (UNLABELED) **(27619-96-1)**
State or local regulations
U.S. - Pennsylvania - RTK (Right to Know) List U.S. - New Jersey - Right to Know Hazardous Substance List

100% METHANOL UNLABELED (67-56-1)
State or local regulations
U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Acceptable Ambient Concentrations U.S. - Massachusetts - Right To Know List U.S. - Pennsylvania - RTK (Right to Know) List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - New York - Reporting of Releases Part 597 - List of Hazardous Substances

SECTION 16: Other information

Other information : This product is not radioactive. The data given for this product are those of the corresponding unlabeled compound, unless specifically indicated otherwise. Health and safety data for labeled compounds are generally not available, but are assumed to be similar or identical to the corresponding unlabeled compound.

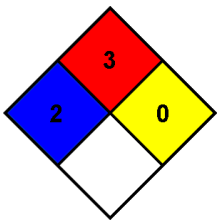
Full text of R-, H- and EUH-phrases:

Acute Tox. 3 (Dermal)	Acute toxicity (dermal) Category 3
Acute Tox. 3 (Inhalation:vapour)	Acute toxicity (inhalation:vapour) Category 3
Acute Tox. 3 (Oral)	Acute toxicity (oral) Category 3
Acute Tox. 4 (Inhalation)	Acute toxicity (inhalation) Category 4
Aquatic Chronic 2	Hazardous to the aquatic environment - Chronic Hazard Category 2
Eye Irrit. 2	Serious eye damage/eye irritation Category 2
Flam. Liq. 2	Flammable liquids Category 2
Skin Irrit. 2	Skin corrosion/irritation Category 2
STOT SE 1	Specific target organ toxicity (single exposure) Category 1
H225	Highly flammable liquid and vapor
H301	Toxic if swallowed
H311	Toxic in contact with skin
H315	Causes skin irritation
H319	Causes serious eye irritation
H331	Toxic if inhaled
H332	Harmful if inhaled
H370	Causes damage to organs
H411	Toxic to aquatic life with long lasting effects
R11	Highly flammable
R20	Harmful by inhalation
R25	Toxic if swallowed
R36/38	Irritating to eyes and skin
R39/23/24/25	Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed
R51/53	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
F	Highly flammable
N	Dangerous for the environment
T	Toxic
Xi	Irritant
Xn	Harmful

NFPA health hazard : 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.

NFPA fire hazard : 3 - Liquids and solids (including finely divided suspended solids) that can be ignited under almost all ambient temperature conditions.

NFPA reactivity : 0 - Material that in themselves are normally stable, even under fire conditions.



Hazard Rating

Health : 2 Moderate Hazard - Temporary or minor injury may occur

Flammability : 3 Serious Hazard

Physical : 0 Minimal Hazard

CIL Mixture SDS

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product

AccuStandard, Inc.
125 Market St., New Haven, CT 06513 USA
Tel: 203-786-5290 Fax: 203-786-5287

SAFETY DATA SHEET

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

1.1 - Product Identifiers

Catalog Name: PFOS-012S

Description: Sodium 1H,1H,2H,2H-perfluoro-1-octanesulfonate in Methanol

1.2 - Relevant Identified Uses of the Substance or Mixture

Laboratory Chemical Reference Material

1.3 - Supplier Details

Company: AccuStandard, Inc.
125 Market St.
New Haven, CT 06513 USA

Telephone Number: 203-786-5290

Fax: 203-786-5287

Email: edocs@accustandard.com

1.4 - Emergency Telephone Number

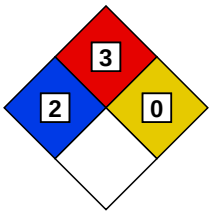
Emergency Phone #: AccuStandard, Inc.
1-203-502-7070 (USA)
+001-203-502-7070 (International)

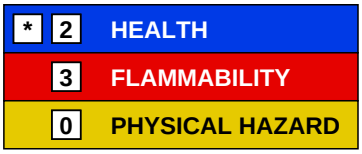
24 hours / 7 days a week

SECTION 2 - HAZARDS IDENTIFICATION

2.1 - GHS Label Elements







Signal Word: Danger

Hazard Codes:

H225 - Highly Flammable (Flammable liquids, category 2)

H301 - Toxic if swallowed. (Acute toxicity, oral, category 3)

H311 - Toxic if absorbed through skin. (Acute toxicity, dermal, category 3)

H315 - Irritating to skin. (Skin corrosion/irritation, category 2)

H320 - Irritating to eyes. (Eye damage/irritation, category 2B)

H332 - Harmful if inhaled. (Acute toxicity, inhalation, category 4)

H336 - Overexposure may cause dizziness, nausea, muscle weakness, narcosis and respiratory failure.

H360 - California Proposition 65 Warning: This product contains a component (or components) that may cause birth defects or other reproductive harm in a quantity greater than or equal to 0.1%.

H370 - Causes damage to organs. (Specific target organ toxicity, single exposure, category 1)

Precautionary Codes:

SECTION 2 - HAZARDS IDENTIFICATION *- continued*

2.1 - GHS Label Elements *- continued*

P202 - This product should only by used by persons trained in the safe handling of hazardous chemicals.

P233 - Store in a tightly closed container. (P404)

P262 - Do not get in eyes, on skin or clothing.

P264 - Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available.

P280 - Protective gloves must be worn to prevent skin contact.

P284 - Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), or a risk assessment shows air-purifying respirators are appropriate, use of a NIOSH/MSHA approved air supplied respirator is advised. Use a full-face respirator with multi-purpose combination (US) or type ABEK (EN14387) respirator cartridges in absence of proper environmental control. Always use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Engineering and/or administrative controls should be implemented to reduce exposure.

P331 - Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person.

P338 - Eye contact: Immediately flush with plenty of water. After initial flushing, remove and contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers.

P360 - Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.

2.2 - Other Hazards

2.2.1 - Symptom of Exposure Health/Environment

Highly Flammable (Flammable liquids, category 2)

Causes damage to organs. (Specific target organ toxicity, single exposure, category 1)

After ingestion or inhalation, initial symptoms may be only that of mild intoxication, but may become severe after 12 or 18 hours.

POISON: May be fatal or cause blindness if swallowed.

Overexposure may cause dizziness, nausea, muscle weakness, narcosis and respiratory failure.

2.2.2 - Potential Health Effects

Irritating to eyes. (Eye damage/irritation, category 2B)

Irritating to skin. (Skin corrosion/irritation, category 2)

Toxic if absorbed through skin. (Acute toxicity, dermal, category 3)

Irritating to mucous membrane and upper respiratory system.

Harmful if inhaled. (Acute toxicity, inhalation, category 4)

Toxic if swallowed. (Acute toxicity, oral, category 3)

2.2.3 - Routes of Entry

Inhalation, ingestion or skin contact.

2.2.4 - Carcinogenicity

California Proposition 65 Warning: This product contains a component (or components) that may cause birth defects or other reproductive harm in a quantity greater than or equal to 0.1%.

SECTION 3 - COMPOSITION / ANALYTES DATA

Description: Sodium 1H,1H,2H,2H-perfluoro-1-octanesulfonate in Methanol

SECTION 3 - COMPOSITION / ANALYTES DATA *- continued*

Analyte	CAS #	% Concentration	ACGIH -TLV (mg/m³) TWA	ACGIH -TLV (mg/m³) STEL	ACGIH -TLV (mg/m³) Skin	OSHA -PEL (mg/m³) TWA	OSHA -PEL (mg/m³) STEL	OSHA -PEL (mg/m³) Skin
Sodium 1H,1H,2H,2H-perfluoro-1-octanesulfonate	N/A	0.010						
Methanol	67-56-1	99.990				260		

SECTION 4 - FIRST AID MEASURES

4.1 - First Aid Procedures - General

Get medical assistance for all cases of overexposure.

4.2 - Eye Contact

Eye contact: Immediately flush with plenty of water. After initial flushing, remove and contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. (P338)

4.3 - Skin Contact

Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse. (P360)

4.4 - Inhalation

Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek immediate medical attention.

4.5 - Ingestion

Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person. (P331)

SECTION 5 - FIRE FIGHTING MEASURES

5.1 - Flammable Properties

Dangerous fire and explosive hazard.

Containers can build up pressure if exposed to heat.

Vapors can travel to a source of ignition and flash back.

During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

5.2 - Extinguishing Media

Use alcohol foam, carbon dioxide, dry chemical, or water spray when fighting fires involving this material.

5.3 - Protection of Firefighters

As in any fire, wear self-contained breathing apparatus pressure demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

6.1 - Spill Response

Wear suitable protective equipment listed under Exposure Controls / Personal Protection. Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards. Contain the release and eliminate its source, if this can be done without risk. Dispose as hazardous waste. Comply with Federal, State and local regulations.

SECTION 7 - HANDLING AND STORAGE

Store in a tightly closed container. (P404)

Store in a cool area away from ignition sources and oxidizers.

Avoid breathing vapors or mists.

Use with adequate ventilation.

Do not get in eyes, on skin or clothing. (P262)

Avoid prolonged or repeated exposure.

This product should only by used by persons trained in the safe handling of hazardous chemicals. (P202)

SECTION 8 - EXPOSURE CONTROLS

8.1 - Engineering Controls/PPE

Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available. (P264)

8.2 - General Hygene Considerations

Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), or a risk assessment shows air-purifying respirators are appropriate, use of a NIOSH/MSHA approved air supplied respirator is advised. Use a full-face respirator with multi-purpose combination (US) or type ABEK (EN14387) respirator cartridges in absence of proper environmental control. Always use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Engineering and/or administrative controls should be implemented to reduce exposure.

Material should be handled or transferred in an approved fume hood or with adequate ventilation.

Protective gloves must be worn to prevent skin contact. (P280)

(Chloroprene, natural rubber, nitrile, or equivalent)

Use eye protection tested and approved under the appropriate government standards such as NIOSH (US) or EN 166 (EU).

All recommendations are advisory only and must be evaluated by an industrial hygienist and/or safety officer familiar with the specific situation of anticipated use, such as concentration and amount of the substance in the workplace. Any recommendation should not be construed as offering an approval for any specific use of the product.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear liquid

Odor: N/A

Odor Threshold: N/A

pH: N/A

Melting Point: -93.9 °C

Boiling Point: 65 °C

Flash Point: 52 °F (11 °C) (tcc)

Evaporation Rate (Butyl Acetate=1): 5.9

Flammability Class: N/A

Lower Flammability Level: 6.7

Upper Flammability Level: 36.5

Vapor Pressure: 97 mmHg (20 °C)

Vapor Density (Air = 1): 1.1 g/L

Specific Gravity: 0.791 g/cm3

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES *- continued*

Solubility in Water: Very soluble

Partition Coefficient: log Pow: -0.77

Autoignition Temperature: 385 °C

Decomposition Temperature: N/A

Viscosity: N/A

VOC Content: N/A

Percent Volatile: 99.9+

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable

Materials to Avoid: Acids
Oxidizers

Hazardous Decomposition: Oxides of carbon; Formaldehyde

Hazardous Polymerization: Will not occur

Condition to Avoid: Heat; Contact with ignition sources

SECTION 11 - TOXICOLOGICAL INFORMATION

Human Health Toxicity

See section 2 for specific toxicological information for the ingredients of this product.

LD50 (Oral): Human - 143 mg/kg; Rat - 1500 mg/kg

LD50 (Dermal) : Rabbit - >2000 mg/kg

LC50 (Inhalation): Rat - >20 mg/L

WARNING: This product contains chemicals known to the state of California to cause birth defects or other reproductive harm.

No other information related to the toxicological properties of this product is available at this time.

SECTION 12 - ECOLOGICAL INFORMATION

Environmental Toxicity

By complying with sections 6 and 7 there should be no release to the environment.

LC50 (Fish): >1000 mg/L 96H

EC50 (Aquatic Invertebrate): >1000 mg/L 48H

BCF: 1.0

Hydrolyzes readily on contact with water. Readily biodegradable.

No other information related to the ecological properties of this product is available at this time.

SECTION 13 - DISPOSAL CONSIDERATIONS

Recycle or incinerate at any EPA approved facility or dispose in compliance with Federal, State and local regulations. Empty containers must be triple-rinsed prior to disposal.

SECTION 14 - TRANSPORT INFORMATION

Transportation Information (DOT/IATA)

SECTION 14 - TRANSPORT INFORMATION *- continued*

UN Number: UN1230

Class: 3

Packing Group: II

Proper Shipping Name: Methanol

Poison by Inhalation: No

Marine Pollutant: No

SECTION 15 - REGULATORY INFORMATION

WARNING: This product contains chemicals known to the state of California to cause birth defects or other reproductive harm.

This product is subject to SARA section 313 reporting requirements.

Not all components are listed on the TSCA Inventory.

For laboratory, research and development use only. Not for manufacturing or commercial purposes.

In addition to federal and state regulations, local regulations may apply. Check with your local regulatory authorities.

SECTION 16 - OTHER INFORMATION

This document has been designed to meet the requirements of OSHA, ANSI, GHS and CHIPs regulations. Chemicals are classified using the Globally Harmonized System for Classification and Labeling of Chemicals and CLP Regulation (EC) No. 1272/2008.

The statements contained herein are offered for informational purposes only and are based on technical data that we believe to be accurate. The manufacturer will not assume any liability for the accuracy and completeness of this information. Final determination of the suitability of the material is the responsibility of the user. Although certain hazards are described herein, the user should not presume that these are the only hazards that exist. Since conditions and manner of use are outside of the manufacturers control, we make

NO WARRANTY OF MERCHANTABILITY, EXPRESSED OR IMPLIED, AND ASSUME NO LIABILITY RESULTING FROM ITS USE.

Legend : N/A = Not Available ND = Not Determined NR = Not Regulated

Alteration of any information contained herein without written permission from the manufacturer is strictly prohibited.

HMIS/NFPA HAZARD INDEX

0 - Minimal
1 - Slight
2 - Moderate
3 - Serious
4 - Severe

* - Additional Hazard

GHS HAZARD INDEX

Category 1 - Most Severe
Category 5 - Least Severe

**** End of Document ****

SAFETY DATA SHEET

Version 4.11
Revision Date 03/05/2015
Print Date 02/07/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Sodium

Product Number : 483745
Brand : Aldrich

CAS-No. : 7440-23-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Substances and mixtures, which in contact with water, emit flammable gases (Category 1), H260
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Carcinogenicity (Category 1A), H350

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H260	In contact with water releases flammable gases which may ignite spontaneously.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H350	May cause cancer.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P223	Keep away from any possible contact with water, because of violent reaction and possible flash fire.

P231 + P232	Handle under inert gas. Protect from moisture.
P260	Do not breathe dust or mist.
P264	Wash skin thoroughly after handling.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P281	Use personal protective equipment as required.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P363	Wash contaminated clothing before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P402 + P404	Store in a dry place. Store in a closed container.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Reacts violently with water.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Formula : Na
Molecular weight : 22.99 g/mol

Hazardous components

Component		Classification	Concentration
Sodium			
CAS-No. EC-No. Index-No.	7440-23-5 231-132-9 011-001-00-0	Water-react. 1; Skin Corr. 1B; Eye Dam. 1; H260, H314	>= 90 - <= 100 %
Paraffin oils			
CAS-No. EC-No.	8012-95-1 232-384-2	Carc. 1A; H350	>= 90 - <= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Dry powder

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.Keep away from sources of ignition - No smoking.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Handle and store under inert gas. Air sensitive.
Storage class (TRGS 510): Hazardous materials, which set free flammable gases upon contact with water

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Paraffin oils	8012-95-1	STEL	10.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation 2014 Adoption Not classifiable as a human carcinogen		
		Upper Respiratory Tract irritation 2014 Adoption Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Upper Respiratory Tract irritation Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		
		TWA	5.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Not classifiable as a human carcinogen		
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Upper Respiratory Tract irritation Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Pieces
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 97.8 °C (208.0 °F) - lit.
f)	Initial boiling point and boiling range	883 °C (1,621 °F) - lit.
g)	Flash point	82 °C (180 °F)
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	0.97 g/cm3

n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Reacts violently with water.

10.4 Conditions to avoid
Air Do not allow water to enter container.
Exposure to moisture

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: 1 - Group 1: Carcinogenic to humans (Paraffin oils)

NTP: Known to be human carcinogenThe reference note has been added by TD based on the background information of the NTP. (Paraffin oils)

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., Aspiration may lead to:, lipid pneumonia, Effects due to ingestion may include:, laxative effect, Gastrointestinal disturbance, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1428 Class: 4.3 Packing group: I
Proper shipping name: Sodium
Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1428 Class: 4.3 Packing group: I EMS-No: F-G, S-N
Proper shipping name: SODIUM

IATA
UN number: 1428 Class: 4.3 Packing group: I
Proper shipping name: Sodium
IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Reactivity Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Sodium	7440-23-5	1993-04-24
Paraffin oils	8012-95-1	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Sodium	7440-23-5	1993-04-24
Paraffin oils	8012-95-1	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Sodium	7440-23-5	1993-04-24
Paraffin oils	8012-95-1	2007-03-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Paraffin oils	8012-95-1	1987-02-27

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Carc.	Carcinogenicity
Eye Dam.	Serious eye damage
H260	In contact with water releases flammable gases which may ignite spontaneously.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H350	May cause cancer.
Skin Corr.	Skin corrosion
Water-react.	Substances and mixtures, which in contact with water, emit flammable gases

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	4
Physical Hazard	2

NFPA Rating

Health hazard:	3
Fire Hazard:	4
Reactivity Hazard:	2
Special hazard.I:	W

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.11 Revision Date: 03/05/2015 Print Date: 02/07/2016

SAFETY DATA SHEET

Version 3.14
Revision Date 12/02/2015
Print Date 02/18/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Styrene

Product Number : 240869
Brand : Aldrich
Index-No. : 601-026-00-0

CAS-No. : 100-42-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 3), H226
Acute toxicity, Inhalation (Category 4), H332
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 2), H361
Specific target organ toxicity - repeated exposure (Category 1), H372
Acute aquatic toxicity (Category 2), H401

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H226 Flammable liquid and vapour.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H332 Harmful if inhaled.
H351 Suspected of causing cancer.
H361 Suspected of damaging fertility or the unborn child.

H372	Causes damage to organs through prolonged or repeated exposure.
H401	Toxic to aquatic life.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Lachrymator.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Phenylethylene Vinylbenzene
Formula	:	$C_8H_8C_8H_8$
Molecular weight	:	104.15 g/mol
CAS-No.	:	100-42-5
EC-No.	:	202-851-5
Index-No.	:	601-026-00-0

Hazardous components

Component	Classification	Concentration
Styrene		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; Carc. 2; Repr. 2; STOT RE 1; Aquatic Acute 2; H226, H315, H319, H332, H351, H361, H372, H401	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Container explosion may occur under fire conditions., Vapours may form explosive mixture with air.

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Recommended storage temperature 2 - 8 °C

Light sensitive.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Styrene	100-42-5	TWA	50.000000 ppm 215.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	100.000000 ppm 425.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
	Remarks	See Table Z-2		
		TWA	100.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.15-1969		
		CEIL	200.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.15-1969		
		Peak	600.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.15-1969		
		TWA	20.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Peripheral neuropathy Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	40.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Peripheral neuropathy Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.15-1969		

		CEIL	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.15-1969		
		Peak	600 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.15-1969		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Styrene	100-42-5	Mandelic acid plus phenylglyoxylic acid	400mg/g Creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
		Styrene	0.2000 mg/l	In venous blood	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			
		Mandelic acid plus phenylglyoxylic acid	400mg/g Creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			
		Styrene	40 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 32 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	sweet
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -31 °C (-24 °F) - lit.
f)	Initial boiling point and boiling range	145 - 146 °C (293 - 295 °F) - lit.
g)	Flash point	32.0 °C (89.6 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 8.9 %(V) Lower explosion limit: 1.1 %(V)
k)	Vapour pressure	6 hPa (5 mmHg) at 20 °C (68 °F)
l)	Vapour density	3.6
m)	Relative density	0.906 g/cm3 at 25 °C (77 °F)
n)	Water solubility	0.05 g/l at 25 °C (77 °F) - slightly soluble
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	490.0 °C (914.0 °F) 480.0 °C (896.0 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Relative vapour density	3.6

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.
Test for peroxide formation before distillation or evaporation. Test for peroxide formation or discard after 1 year.
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.Vapours may form explosive mixture with air.

10.4 Conditions to avoid
May polymerize on exposure to light.
Heat, flames and sparks.

10.5 Incompatible materials
Oxidizing agents, Copper

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - > 6,000 mg/kg

LC50 Inhalation - Rat - 4 h - 12,000 mg/m3

LD50 Dermal - Rat - male and female - > 2,000 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation - 24 h

Respiratory or skin sensitisation
Maximisation Test (GPMT) - Guinea pig
Does not cause skin sensitisation.
(OECD Test Guideline 406)

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Styrene)
NTP:	Reasonably anticipated to be a human carcinogen (Styrene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
Suspected of damaging the unborn child. Suspected human reproductive toxicant

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: WL3675000

Dermatitis, Central nervous system depression, Nausea, Dizziness, Headache, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Endocrine system. -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	NOEC - Pimephales promelas (fathead minnow) - 4 mg/l - 96 h
	LC50 - Pimephales promelas (fathead minnow) - 32 mg/l - 96 h
	LOEC - Pimephales promelas (fathead minnow) - 7.6 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 4.7 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	IC50 - Pseudokirchneriella subcapitata (green algae) - 1.4 mg/l - 72 h

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: > 60 % - Readily biodegradable

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life.

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2055 Class: 3 Packing group: III
Proper shipping name: Styrene monomer, stabilized
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 2055 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: STYRENE MONOMER, STABILIZED

IATA
UN number: 2055 Class: 3 Packing group: III
Proper shipping name: Styrene monomer, stabilized

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Styrene	100-42-5	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Styrene	100-42-5	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Styrene	100-42-5	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Styrene	100-42-5	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H351	Suspected of causing cancer.
H361	Suspected of damaging fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H401	Toxic to aquatic life.

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.14 Revision Date: 12/02/2015 Print Date: 02/18/2016

SAFETY DATA SHEET

Version 6.12
Revision Date 09/07/2024
Print Date 09/08/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : *tert*-Butanol

Product Number : 471712
Brand : Sigma-Aldrich
Index-No. : 603-005-00-1
CAS-No. : 75-65-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Acute toxicity, Inhalation (Category 4), H332
Eye irritation (Category 2A), H319

The life science business of Merck KGaA, Darmstadt, Germany
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Specific target organ toxicity - single exposure (Category 3), Respiratory system, Central nervous system, H335, H336

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Danger

Hazard Statements

H225	Highly flammable liquid and vapor.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H335	May cause respiratory irritation.
H336	May cause drowsiness or dizziness.

Precautionary Statements

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing mist or vapors.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : 2-Methyl-2-propanol

The life science business of Merck KGaA, Darmstadt, Germany
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Trimethyl carbinol
tert-Butyl alcohol

Formula	:	$C_4H_{10}O$
Molecular weight	:	74.12 g/mol
CAS-No.	:	75-65-0
EC-No.	:	200-889-7
Index-No.	:	603-005-00-1

Component	Classification	Concentration
tert-Butanol		
	Flam. Liq. 2; Acute Tox. 4; Eye Irrit. 2A; STOT SE 3; H225, H332, H319, H335, H336 Concentration limits: 20 %: STOT SE 3, H335;	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

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SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2) Foam Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Flash back possible over considerable distance.
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
Development of hazardous combustion gases or vapours possible in the event of fire.
Forms explosive mixtures with air at ambient temperatures.

5.3 Advice for firefighters

In the event of fire, wear self-contained breathing apparatus.

5.4 Further information

In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion.Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material (e.g. Chemizorb®).
Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

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Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
tert-Butanol	75-65-0	TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not classifiable as a human carcinogen		
		TWA	100 ppm 300 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	150 ppm 450 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100 ppm 300 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		STEL	150 ppm 450 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		PEL	100 ppm 300 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.

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Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 480 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Chloroprene
Minimum layer thickness: 0.65 mm
Break through time: 240 min
Material tested:KCL 720 Camapren®

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter A (acc. to DIN 3181) for vapours of organic compounds
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid
b)	Odor	camphor-like
c)	Odor Threshold	ca.71 ppm

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d)	pH	at 20 °C (68 °F)neutral
e)	Melting point/freezing point	Melting point/ range: 23 - 26 °C (73 - 79 °F)
f)	Initial boiling point and boiling range	83 °C 181 °F
g)	Flash point	15 °C (59 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 8.0 %(V) Lower explosion limit: 2.3 %(V)
k)	Vapor pressure	40.7 hPa at 20 °C (68 °F)
l)	Vapor density	2.56
m)	Density	0.775 g/mL at 25 °C (77 °F)
	Relative density	No data available
n)	Water solubility	soluble
o)	Partition coefficient: n-octanol/water	log Pow: 0.30 - Bioaccumulation is not expected.
p)	Autoignition temperature	470 °C (878 °F) at 1,013 hPa - see user defined free text
q)	Decomposition temperature	No data available
r)	Viscosity	5.72 mm2/s at 25 °C (77 °F) - OECD Test Guideline 114 - 2.23 mm2/s at 45 °C (113 °F) - OECD Test Guideline 114 -
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

Surface tension	69.8 mN/m at 1.09g/l at 21 °C (70 °F) - OECD Test Guideline 115
Dissociation constant	19.2 at 20 °C (68 °F)
Relative vapor density	2.56

SECTION 10: Stability and reactivity

10.1 Reactivity

Vapors may form explosive mixture with air.

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10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Violent reactions possible with:
Alkali metals
Alkaline earth metals
Strong acids
Aluminum
Strong oxidizing agents

10.4 Conditions to avoid
Warming.

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 3,046 mg/kg
(US-EPA)
Acute toxicity estimate Inhalation - 4 h - 11.1 mg/l - vapor

(Expert judgment)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
LD50 Dermal - Rabbit - male and female - > 2,000 mg/kg
(US-EPA)

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 24 h
(Draize Test)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Causes serious eye irritation.
(US-EPA)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Test Type: In vitro mammalian cell gene mutation test
Test system: Mouse lymphoma test
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476

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Result: negative
Test Type: Chromosome aberration test in vitro
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473
Result: negative
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: sister chromatid exchange assay
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 479
Result: negative

Test Type: Micronucleus test
Species: Mouse
Cell type: Red blood cells (erythrocytes)
Application Route: Oral
Method: OECD Test Guideline 474
Result: negative

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
Inhalation - May cause respiratory irritation. - Respiratory system
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
Inhalation - May cause drowsiness or dizziness. - Nervous system

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: EO1925000
drying, cracking of the skin, Skin irritation
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Liver - Irregularities - Based on Human Evidence

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Liver - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Pimephales promelas (fathead minnow) - > 961 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 933 mg/l - 48 h (Directive 67/548/EEC, Annex V, C.2.)
Toxicity to algae	static test ErC50 - Pseudokirchneriella subcapitata (green algae) - > 976 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to bacteria	static test EC50 - Pseudomonas putida - > 10,000 mg/l - 16 h (DIN 38 412 Part 8)
	static test EC10 - Pseudomonas putida - 6,900 mg/l - 16 h (DIN 38 412 Part 8)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	semi-static test EC50 - Daphnia magna (Water flea) - > 100 mg/l - 21 d (OECD Test Guideline 211)
	semi-static test NOEC - Daphnia magna (Water flea) - 100 mg/l - 21 d (OECD Test Guideline 211)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 56 d Result: 66 % - Inherently biodegradable. Remarks: (ECHA)

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 1120 Class: 3 Packing group: II
Proper shipping name: Butanols
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 1120 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: BUTANOLS

IATA
UN number: 1120 Class: 3 Packing group: II
Proper shipping name: Butanols

SECTION 15: Regulatory information

CERCLA Reportable Quantity
This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

tert-Butanol	75-65-0	>= 90 - <= 100 %

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US State Regulations

Massachusetts Right To Know

tert-Butanol	75-65-0

Pennsylvania Right To Know

tert-Butanol	75-65-0

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 6.12 Revision Date: 09/07/2024 Print Date: 09/08/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 3.5
Revision Date 11/04/2015
Print Date 02/22/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : *tert*-Butylbenzene

Product Number : B90602
Brand : Aldrich

CAS-No. : 98-06-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 3), H226
Eye irritation (Category 2A), H319
Acute aquatic toxicity (Category 2), H401
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H226 Flammable liquid and vapour.
H319 Causes serious eye irritation.
H411 Toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.

P264	Wash skin thoroughly after handling.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P391	Collect spillage.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : 2-Methyl-2-phenylpropane

Formula : $C_{10}H_{14}$

Molecular weight : 134.22 g/mol

CAS-No. : 98-06-6

EC-No. : 202-632-4

Hazardous components

Component	Classification	Concentration
tert-Butylbenzene		
	Flam. Liq. 3; Eye Irrit. 2A; Aquatic Acute 2; Aquatic Chronic 2; H226, H319, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Impervious clothing, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -58 °C (-72 °F) - lit.
f)	Initial boiling point and boiling range	169 °C (336 °F) - lit.
g)	Flash point	34.0 °C (93.2 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower	Lower explosion limit: 0.8 %(V)

	flammability or explosive limits	
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	0.867 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 3.80
p)	Auto-ignition temperature	450.0 °C (842.0 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 3,045 mg/kg
Remarks: Behavioral:Somnolence (general depressed activity). Behavioral:Tremor. Gastrointestinal:Changes in structure or function of salivary glands.

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: CY9120000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC0 - Leuciscus idus (Golden orfe) - 44 mg/l - 48.0 h
	LC50 - Leuciscus idus (Golden orfe) - 65 mg/l - 48.0 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 41 mg/l - 24 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2709 Class: 3 Packing group: III
Proper shipping name: Butyl benzenes
Marine pollutant:yes
Poison Inhalation Hazard: No

IMDG
UN number: 2709 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: BUTYLBENZENES
Marine pollutant:yes

IATA
UN number: 2709 Class: 3 Packing group: III
Proper shipping name: Butylbenzenes

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
tert-Butylbenzene	98-06-6	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
tert-Butylbenzene	98-06-6	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids

H226	Flammable liquid and vapour.
H319	Causes serious eye irritation.
H401	Toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.5 Revision Date: 11/04/2015 Print Date: 02/22/2016

SAFETY DATA SHEET

Version 8.10
Revision Date 09/06/2024
Print Date 09/07/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Tetrachloroethylene

Product Number : 371696
Brand : Sigma-Aldrich
Index-No. : 602-028-00-4
CAS-No. : 127-18-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Skin sensitization (Category 1), H317

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Carcinogenicity (Category 2), H351
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Short-term (acute) aquatic hazard (Category 2), H401
Long-term (chronic) aquatic hazard (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word: Warning

Hazard Statements

H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H411	Toxic to aquatic life with long lasting effects.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P261	Avoid breathing mist or vapors.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P272	Contaminated work clothing must not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

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SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	Perchloroethylene PCE
Formula	:	C_2Cl_4
Molecular weight	:	165.83 g/mol
CAS-No.	:	127-18-4
EC-No.	:	204-825-9
Index-No.	:	602-028-00-4

Component	Classification	Concentration
Tetrachlorethylene		
	Skin Irrit. 2; Eye Irrit. 2A; Skin Sens. 1; Carc. 2; STOT SE 3; Aquatic Acute 2; Aquatic Chronic 2; H315, H319, H317, H351, H336, H401, H411 Concentration limits: >= 20 %: STOT SE 3, H336;	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

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4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

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Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class
Storage class (TRGS 510): 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Tetrachlorethylene	127-18-4	TWA	25 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Confirmed animal carcinogen with unknown relevance to humans		
		STEL	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Confirmed animal carcinogen with unknown relevance to humans		
		Potential Occupational Carcinogen		

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		TWA	100 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		CEIL	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Peak	300 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		PEL	25 ppm 170 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	100 ppm 685 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		C	300 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Tetrachlorethylene	127-18-4	Tetrachloroethylene	3parts per million	In end-exhaled air	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Prior to shift (16 hours after exposure ceases)			
		Tetrachloroethylene	0.5 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
		Prior to shift (16 hours after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Viton®
Minimum layer thickness: 0.7 mm

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Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 240 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter A (acc. to DIN 3181) for vapours of organic compounds
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Color: colorless
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: -22 °C (-8 °F) - lit.
f)	Initial boiling point and boiling range	121 °C 250 °F - lit.
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower	No data available

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	flammability or explosive limits	
k)	Vapor pressure	25.3 hPa at 25.0 °C (77.0 °F) 17.3 hPa at 20.0 °C(68.0 °F)
l)	Vapor density	No data available
m)	Density	1.623 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	0.15 g/l at 25 °C (77 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 2.53 at 23 °C (73 °F) - Bioaccumulation is not expected.
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	32.1 mN/m at 20 °C (68 °F)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Risk of explosion with:
Alkali metals
Aluminum
sodium amide
Barium
nitrogen dioxide
Oxygen
with
alkali hydroxides
Exothermic reaction with:
strong alkalis
Alkaline earth metals
strong alkalis
Light metals
Powdered metals

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Oxidizing agents
Strong acids
Strong bases
nitrous gases
Risk of ignition or formation of inflammable gases or vapours with:
zinc oxide
with
Aluminum

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
various plastics

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 3,420 mg/kg
(OECD Test Guideline 401)
Remarks: (ECHA)
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation - 4 h
(OECD Test Guideline 404)
Remarks: (ECHA)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation - 24 h
(Draize Test)
Remarks: (RTECS)

Respiratory or skin sensitization
Local lymph node assay (LLNA) - Mouse
Result: May cause sensitization by skin contact.
(OECD Test Guideline 429)
Remarks: (ECHA)

Germ cell mutagenicity
Test Type: Chromosome aberration test in vitro
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473

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Result: negative
Remarks: (ECHA)
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Remarks: (ECHA)

Test Type: Micronucleus test
Species: Mouse

Application Route: Intraperitoneal
Method: OECD Test Guideline 474
Result: negative
Remarks: (ECHA)

Carcinogenicity
Suspected of causing cancer.

IARC:	2A - Group 2A: Probably carcinogenic to humans (Tetrachlorethylene)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (Tetrachlorethylene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Mouse - female - Oral - LOAEL (Lowest observed adverse effect level) - 390 mg/kg

RTECS: KX3850000
narcosis, Liver injury may occur., Kidney injury may occur.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Oncorhynchus mykiss (rainbow trout) - 5 mg/l - 96 h Remarks: (ECHA)

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Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 7.50 mg/l - 48 h
Toxicity to algae	ErC50 - Chlamydomonas reinhardtii (green algae) - 3.64 mg/l - 72 h Remarks: (ECHA)
Toxicity to fish(Chronic toxicity)	flow-through test NOEC - Jordanella floridae - 1.99 mg/l - 10 d Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	semi-static test NOEC - Daphnia magna (Water flea) - 0.51 mg/l - 28 d Remarks: (ECHA)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 11 % - Not readily biodegradable. (OECD Test Guideline 301C)

12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 21 d - 0.00343 mg/l(Tetrachlorethylene) Bioconcentration factor (BCF): 49

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

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SECTION 14: Transport information

DOT (US)
UN number: 1897 Class: 6.1 Packing group: III
Proper shipping name: Tetrachloroethylene
Reportable Quantity (RQ): 100 lbs
Reportable Quantity (RQ): 100 lbs
Reportable Quantity (RQ): 10 lbs
Reportable Quantity (RQ): 10 lbs
Marine pollutant: yes Poison Inhalation Hazard: No

IMDG
UN number: 1897 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TETRACHLOROETHYLENE
Marine pollutant : yes
Marine pollutant : yes

IATA
UN number: 1897 Class: 6.1 Packing group: III
Proper shipping name: Tetrachloroethylene

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Tetrachlorethylene	127-18-4	100	100
Tetrachlorethylene	127-18-4	100	100 (D039)
Tetrachlorethylene	127-18-4	10	10 (F001)
Tetrachlorethylene	127-18-4	10	10 (F002)

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Acute Health Hazard
Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Tetrachlorethylene 127-18-4 >= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know
Tetrachlorethylene 127-18-4

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Pennsylvania Right To Know

Tetrachlorethylene 127-18-4

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Tetrachlorethylene 127-18-4

Washington Chemicals of High Concern

Tetrachlorethylene 127-18-4

California Prop. 65

WARNING: This product can expose you to chemicals including Tetrachlorethylene, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 8.10 Revision Date: 09/06/2024 Print Date: 09/07/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Matrix Scientific

PO BOX 25067
COLUMBIA, SC 29224-5067
Telephone: 803-788-9494 Fax: 803-788-9419

SAFETY DATA SHEET

Transportation Emergency: 3E Co. (5025) 800-451-8346

1. Product Identification

Name Undecafluoro-2-methyl-3-oxahexanoic acid

Catalog Number	018340
CAS Registry Number	[13252-13-6]
Company	Matrix Scientific
Physical Address	131 Pontiac Business Center Drive Elgin, SC 29045 USA
Telephone/Fax	(803)788-9494/(803)788-9419

2. Hazard Identification

Hazardous Ingredients Undecafluoro-2-methyl-3-oxahexanoic acid

GHS label elements, including precautionary statements

Pictogram



Signal word DANGER

Hazard statement(s)

H302	Harmful if swallowed
H314	Causes severe skin burns and eye damage
H317	H317 May cause an allergic skin reaction
H318	Causes serious eye damage
H319	H319 Causes serious eye irritation

Precautionary statement(s)

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P301+330+331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303+361+353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P305+351+338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do - continue rinsing.
P501	Dispose of contents/container to … [… in accordance with

local/regional/national/international regulation (to be specified)].

3. Composition, Information or Ingredients

Name Undecafluoro-2-methyl-3-oxahexanoic acid

4. First Aid Measures

Eye Contact: Check for and remove any contact lenses. Immediately flush eyes with clean, running water for at least 15 minutes while keeping eyes open. Cool water may be used. Seek medical attention.

Skin Contact: After contact with skin, wash with generous quantities of running water. Gently and thoroughly wash affected area with running water and non-abrasive soap. Cool water may be used. Cover the affected area with emollient. Seek medical attention. Wash any contaminated clothing prior to reusing.

Inhalation: Remove the victim from the source of exposure to fresh, uncontaminated air. If victim's breathing is difficult, administer oxygen. Seek medical attention.

Ingestion: Do NOT induce vomiting. Give water to victim to drink. Seek medical attention.

5. Fire-Fighting Measures

Extinguishing media: Carbon dioxide, dry chemical powder, alcohol or polymer foam.

Special fire fighting procedures: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

Unusual fire and explosion hazards/ decomposition of product: Emits toxic fumes under fire conditions.

6. Accidental Release Measures

Steps to be taken if material is spilled or otherwise released into the environment - Wear Appropriate respirator, impervious boots and heavy rubber (or otherwise impervious) gloves. Scoop up solid material or absorb liquid material and place into appropriate container. Ventilate area and wash affected spill area after pickup is complete. Wash skin immediately with plenty of water. Place solid or absorbed material into containers and close for disposal.

7. Handling and Storage

Avoid prolonged exposure.
Use caution when handling.
Exposure to any chemical should be limited.
Do not breath dust or vapor.
Have safety shower and eye wash available.

Do not get in eyes, on skin or on clothing.
Keep container tightly closed.
Store in a cool, dry, well-ventilated place.
Ensure adequate ventilation during use.
Use only in a chemical fume hood.
To the best of our knowledge, the health hazards of this product have not been fully investigated.
This product is provided solely for the purpose of research and development.

8. Exposure Controls and Personal Protection

Wear Protective safety goggles.
Wear chemical-resistant gloves.
Wear protective clothing and chemical resistant boots.
Ensure ventilation during use.
After contact with skin, wash immediately.

9. Physical and Chemical Properties

Appearance: liquid
Molecular Formula: C6HF11O3
Molecular Weight: 330.06
Boiling point (C): 186-188°
Density (g/ml): 1.85

10. Stability and Reactivity

Incompatibilities: Strong oxidizing agents
Strong acids and bases

Hazard Decomposition Products

Carbon	carbon monoxide
	carbon dioxide
Fluorine	hydrogen fluoride

11. Toxicological Information

Acute effects:
Irritant
May be harmful by ingestion and inhalation.
Material is irritating to mucous membranes and upper respiratory tract.
To the best of our knowledge, the toxicological properties of this product have not been fully investigated or determined.

12. Ecological Information

Mobility: Data not known
Persistence and degradability: No data available

Cumulative potential: No data available
Other adverse effects: No data available

13. Disposal Considerations

Absent other actions demanded by federal or local regulations - Dissolve or mix the material with a combustible solvent and burn in a requlated, chemical incinerator equipped with after burner and scrubber.
Observe all federal, state and local laws.

14. Transport Information

Shipping Name Corrosive liquid, acidic, organic, n.o.s.
Class / Sub-Class 8
UN Number UN3265
Packing Group II
Inhalation Hazard Zone

15. Regulatory Information

Adhere to all Federal, State and local regulations.

16. Other Information

The information contained herein is accurate to the best of our knowledge, but is not meant to be complete and is included only as a guide. The end user is responsible for any damage resulting from handling or from contact with this product.

SAFETY DATA SHEET

Version 4.11
Revision Date 10/29/2015
Print Date 03/03/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Tetrahydrofuran

Product Number : 401757
Brand : Sigma-Aldrich
Index-No. : 603-025-00-0

CAS-No. : 109-99-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Acute toxicity, Oral (Category 4), H302
Eye irritation (Category 2A), H319
Carcinogenicity (Category 2), H351
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H302 Harmful if swallowed.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H351 Suspected of causing cancer.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and

	understood.
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

May form explosive peroxides.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	THF
Formula	:	C_4H_8O
Molecular weight	:	72.11 g/mol
CAS-No.	:	109-99-9
EC-No.	:	203-726-8
Index-No.	:	603-025-00-0
Registration number	:	01-2119444314-46-XXXX

Hazardous components

Component	Classification	Concentration
Tetrahydrofuran		
	Flam. Liq. 2; Acute Tox. 4; Eye Irrit. 2A; Carc. 2; STOT SE 3; H225, H302, H319, H335, H351	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Dry residue is explosive. Store under inert gas. Test for peroxide formation periodically and before distillation.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Tetrahydrofuran	109-99-9	TWA	50.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Upper Respiratory Tract irritation Kidney damage Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		STEL	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Upper Respiratory Tract irritation Kidney damage Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	200.000000 ppm 590.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	250.000000 ppm 735.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	200.000000 ppm 590.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Tetrahydrofuran	109-99-9	Tetrahydrofuran	2.0000 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

Derived No Effect Level (DNEL)

Application Area	Exposure routes	Health effect	Value
Workers	Skin contact	Long-term systemic effects	25mg/kg BW/d
Consumers	Skin contact	Long-term systemic effects	15mg/kg BW/d
Workers	Inhalation	Long-term local effects	150 mg/m3
Workers	Inhalation	Long-term systemic effects	150 mg/m3
Consumers	Inhalation	Long-term systemic effects	62 mg/m3
Consumers	Inhalation	Acute local effects	150 mg/m3
Consumers	Inhalation	Acute systemic effects	150 mg/m3

Predicted No Effect Concentration (PNEC)

Compartment	Value
Soil	2.13 mg/kg
Marine water	0.432 mg/l
Fresh water	4.32 mg/l
Marine sediment	2.33 mg/kg
Fresh water sediment	23.3 mg/kg
Onsite sewage treatment plant	4.6 mg/l

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 18 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	ether-like
c)	Odour Threshold	No data available
d)	pH	ca.7
e)	Melting point/freezing	Melting point/range: -108.44 °C (-163.19 °F) at 1,013.25 hPa (760.00

	point	mmHg)
f)	Initial boiling point and boiling range	65.0 - 67.0 °C (149.0 - 152.6 °F) at 1,013.25 hPa (760.00 mmHg)
g)	Flash point	-17.0 °C (1.4 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 11.8 %(V) Lower explosion limit: 1.8 %(V)
k)	Vapour pressure	170 hPa (128 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	ca.2.5 at 25 °C (77 °F) - (Air = 1.0)
m)	Relative density	0.89 g/cm3
n)	Water solubility	soluble
o)	Partition coefficient: n-octanol/water	log Pow: 0.46
p)	Auto-ignition temperature	215 °C (419 °F) at 1,013 hPa (760 mmHg)
q)	Decomposition temperature	No data available
r)	Viscosity	0.518 mm2/s at 25 °C (77 °F) - 0.403 mm2/s at 50 °C (122 °F) -
s)	Explosive properties	Not explosive, In use may form flammable/explosive vapour-air mixture.
t)	Oxidizing properties	The substance or mixture is not classified as oxidizing.

9.2 Other safety information

Relative vapour density	ca.2.5 at 25 °C (77 °F) - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.
Test for peroxide formation before distillation or evaporation. Test for peroxide formation or discard after 1 year.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents, Acids

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 1,650 mg/kg

LC50 Inhalation - Rat - 6 h - 14.7 mg/l
Remarks: Material may be irritating to mucous membranes and upper respiratory tract.

LD50 Dermal - Rat - > 2,000 mg/kg

No data available

Skin corrosion/irritation
Based on available data, the classification criteria are not met.

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Risk of serious damage to eyes.
(Draize Test)

Respiratory or skin sensitisation
Based on available data, the classification criteria are not met.

Germ cell mutagenicity
In vivo tests did not show mutagenic effects

Ames test
S. typhimurium
Result: negative

Carcinogenicity

Suspected human carcinogens

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No toxicity to reproduction

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness. - Nervous system
May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

Aspiration hazard
No aspiration toxicity classification

Additional Information
RTECS: LU5950000

Central nervous system depression, Cough, chest pain, Difficulty in breathing, Exposure to high airborne concentrations can cause anesthetic effects.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 2,160 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 382 mg/l - 24 h
Toxicity to algae	Growth inhibition IC50 - Algae - 3,700 mg/l - 192 h

12.2 Persistence and degradability

Biodegradability

(OECD Test Guideline 301)

Remarks: According to the results of tests of biodegradability this product is not readily biodegradable.

12.3 Bioaccumulative potential

No bioaccumulation is to be expected (log Pow <= 4).

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 2056 Class: 3 Packing group: II

Proper shipping name: Tetrahydrofuran

Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

IMDG

UN number: 2056 Class: 3 Packing group: II EMS-No: F-E, S-D

Proper shipping name: TETRAHYDROFURAN

IATA

UN number: 2056 Class: 3 Packing group: II

Proper shipping name: Tetrahydrofuran

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Tetrahydrofuran	109-99-9	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Tetrahydrofuran	109-99-9	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Tetrahydrofuran	109-99-9	1993-04-24

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H302	Harmful if swallowed.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H351	Suspected of causing cancer.
STOT SE	Specific target organ toxicity - single exposure

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.11 Revision Date: 10/29/2015 Print Date: 03/03/2016

Thallium

SAFETY DATA SHEET

1 PRODUCT AND SUPPLIER IDENTIFICATION

Product Name: Thallium Solid

Formula: Tl

Supplier: ESPI Metals
1050 Benson Way
Ashland, OR 97520

Telephone: 800-638-2581

Fax: 541-488-8313

Email: sales@espimetals.com

Emergency: Infotrac 800-535-5053 (US) or 352-323-3500 (24 hour)

Recommended Uses: Scientific Research

2 HAZARDS IDENTIFICATION

GHS Classification (29 CFR 1910.1200): Acute toxicity - oral, category 2.

GHS Label Elements:



Signal Word: Danger

Hazard Statements: H300 Fatal if swallowed.

Precautionary Statements: P264 Wash hands thoroughly after handling, P270 Do not eat, drink or smoke when using this product, P301+P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician, P330 Rinse mouth, P405 Store locked up, P501 Dispose of contents/container in accordance with local, state or federal regulations.

3 COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient: Thallium

CAS#: 7440-28-0

%: 100

EC#: 231-138-1

4 FIRST AID MEASURES

General Measures: Emergency responders should take care to avoid secondary exposure to thallium if it is present. Wear appropriate protective equipment.

INHALATION: Remove to fresh air, keep warm and quiet, give oxygen if breathing is difficult. Seek immediate medical attention. If mouth-to-mouth is necessary always use a barrier or bag-valve-mask device.

INGESTION: Rinse mouth with water. Do not induce vomiting. Seek immediate medical attention. Never induce vomiting or give anything by mouth to an unconscious person.

SKIN: Remove contaminated clothing, wash affected area with soap and water taking care not to break the skin and to cover all open wounds. Seek medical attention. Contaminated clothing should be safely contained and properly disposed of.

EYES: Flush eyes with lukewarm water, including under upper and lower eyelids, for at least 15 minutes. Seek medical attention immediately.

Most Important Symptoms/Effects, Acute and Delayed: Symptoms are usually delayed and include gastrointestinal distress and neurological symptoms. See section 11 for more information.

Indication of Immediate Medical Attention and Special Treatment: No other information available.

5 FIREFIGHTING MEASURES

Extinguishing Media: Use extinguishing media suitable for surrounding materials and type of fire.

Unsuitable Extinguishing Media: No further information available.

Specific Hazards Arising from the Material: Under fire conditions, thallium may release highly toxic fumes or gases.

Special Protective Equipment and Precautions for Firefighters: Full face, self-contained breathing apparatus and full protective clothing.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures: Wear appropriate respiratory and protective equipment specified in section 8. Isolate spill area and provide ventilation. Avoid breathing dust or fume. Avoid contact with skin and eyes. Eliminate all sources of ignition.

Methods and Materials for Containment and Cleaning Up: Scoop up or vacuum with a system utilizing a HEPA filtration system and place in properly labeled sealed containers. Special precautions must be taken when changing filters on HEPA vacuum cleaners used to clean up hazardous materials. Avoid creating dusts. Avoid contamination of air and water.

Environmental Precautions: Do not allow to enter drains or to be released to the environment.

7 HANDLING AND STORAGE

Precautions for Safe Handling: Wear appropriate respiratory and protective equipment specified in section 8. Only trained personnel should work with this product. Handle in a well-ventilated area. Avoid exposure to high temperature. Avoid breathing fumes. Avoid contact with skin and eyes. Wash thoroughly before eating or smoking.

Conditions for Safe Storage, Including Any Incompatibilities: Store under dry, inert gas such as argon, or can also be stored under deaerated water. Store in sealed unbreakable containers; the original labeled shipping container when possible. Store in an area that is cool, dry and temperature-controlled, away from direct sunlight, heat and ignition sources or where freezing is possible. Do not store together with acids, halogens or oxidizers. See section 10 for more information on incompatible materials.

8 EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits: Thallium (Soluble compounds, as Tl)

OSHA/PEL: 0.1 mg/m^3

ACGIH/TLV: 0.02 mg/m^3(inhalable)

Appropriate Engineering Controls: Handle in an enclosed, controlled process under dry argon. Whenever possible the use of local exhaust ventilation, process enclosure or other engineering controls is the preferred method of controlling exposure to meet established occupational exposure limits. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Clothing worn in areas of exposure to thallium dust or vapor should be restricted to the workplace and stored in special lockers.

Individual Protection Measures, Such as Personal Protective Equipment:

Respiratory Protection: When potential exposures are above the occupational limits, approved respirators must be used.

Eye Protection: Splash goggles or safety glasses.

Skin Protection: Wear impermeable gloves, protective work clothing as necessary.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:

Form: Rod

Color: Gray metallic

Odor: Odorless

Odor Threshold: Not determined

pH: N/A

Melting Point: 303.5 ^{o}C

Boiling Point: 1457±10 ^{o}C

Flash Point: N/A

Evaporation Rate: N/A

Flammability: No data

Upper Flammable Limit: No data

Lower Flammable Limit: No data

Vapor Pressure: 1 mm Hg @ 825 ^{o}C

Vapor Density: N/A

Relative Density (Specific Gravity): 11.85 g/cc

Solubility in H_2O: Insoluble

Partition Coefficient (n-octanol/water): Not determined

Autoignition Temperature: No data

Decomposition Temperature: No data

Viscosity: N/A

10 STABILITY AND REACTIVITY

Reactivity: No data

Chemical Stability: Stable under recommended storage conditions.

Possibility of Hazardous Reactions: High temperatures will generate toxic thallium oxide fumes.

Conditions to Avoid: Avoid high temperatures, reacts slowly with moist air.

Incompatible Materials: Oxidizing agents, strong acids, halogens, air and moisture.

Hazardous Decomposition Products: Thallium oxide fume.

11 TOXICOLOGICAL INFORMATION

Likely Routes of Exposure: Inhalation, skin and eyes.

Symptoms of Exposure: Abdominal pain and vomiting, extreme pain in the extremities, lethargy, hair loss.

Acute and Chronic Effects: Almost all of the available information refers to ingestion of thallium compounds, largely due to accidental ingestion, intentional poisoning and suicide attempts. Adverse reactions are dose dependent and occur in 3 stages. Massive doses may cause gastrointestinal distress (nausea, vomiting and abdominal pain) within 30 minutes but symptoms are usually delayed for 8 hours or longer. Gastrointestinal symptoms from smaller doses may

be delayed 24-48 hours. This is followed by neurological effects 2-5 days or even longer after ingestion, although it may occur as early as 12 hours after massive exposure. Other effects include hair loss, severe pain in the extremities, lethargy, ataxia, back pain, abnormal reflexes, neuropathy, muscle weakness, mental abnormalities, tremors, abnormal vision, headache, coma, convulsion, and death. There was no information available for exposure to thallium metal specifically rather than thallium compounds, and little conclusive information regarding exposure via inhalation.

Acute Toxicity: No data

Carcinogenicity: **NTP**: Not identified as carcinogenic **IARC**: Not identified as carcinogenic

To the best of our knowledge the chemical, physical and toxicological characteristics of the substance are not fully known.

12 ECOLOGICAL INFORMATION

Ecotoxicity: LC50 - Cyprinodon variegatus (sheepshead minnow) - 21.0 mg/l - 96.0 h

Persistence and Degradability: No data

Bioaccumulative Potential: No data

Mobility in Soil: No data

Other Adverse Effects: Do not allow material to be released to the environment. No further relevant information available.

13 DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Product: Dispose of in accordance with Federal, State and Local regulations.

Packaging: Dispose of in accordance with Federal, State and Local regulations.

14 TRANSPORT INFORMATION

UN Number: UN3288

UN Proper Shipping Name: Toxic solid, inorganic, n.o.s. (Thallium)

Transport Hazard Class: 6.1

Packing Group: II

Marine Pollutant: Yes

15 REGULATORY INFORMATION

TSCA Listed: All components are listed.

Regulation (EC) No 1272/2008 (CLP): Acute toxicity - oral, category 2, Hazardous to the aquatic environment - acute hazard, category 3, Hazardous to the aquatic environment - chronic hazard, category 3.

Canada WHMIS Classification (CPR, SOR/88-66): Acute toxicity.

HMIS Ratings: **Health**: 3 **Flammability**: 0 **Physical**: 0

NFPA Ratings: **Health**: 3 **Flammability**: 0 **Instability**: 0

Chemical Safety Assessment: A chemical safety assessment has not been carried out.

16 OTHER INFORMATION

The information contained in this document is based on the state of our knowledge at the time of publication and is believed to be correct, but does not purport to be all inclusive and shall be used only as a guide. ESPI Metals makes no representation, warranty, or guarantee of any kind with respect to the information contained in this document or any use of the product based on this information. ESPI Metals shall not be held liable for any damages resulting from handling or from contact with the above product. Users should satisfy themselves that they have all current data relevant to their particular use.

Prepared by: ESPI Metals

Revised/Reviewed: July 2015

Safety Data Sheets (SDS)

SECTION 1-IDENTIFICATION

Product name: Toluene

Other names:-

Proper shipping name: Toluene

Recommended use of the chemical and restrictions on use:
The major use of toluene is as a mixture added to gasoline to improve octane ratings. Used as a solvent for paint, resins, lacquers inks & adhesives. Component of solvent blends and thinners. Used in the manufacture of chemicals, dyes, explosives, benzoic acid. Some grades of toluene may contain traces of xylene and benzene.
The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation.
WARNING: Intentional misuse by concentrating/inhaling contents may be lethal.

Manufacturer/Supplier Name: Taiwan SM Corp., Kaohsiung plant
Address: NO.7, Industrial 1st Rd, Lin-Yuan Kaohsiung County 83203, Taiwan, R.O.C.
Phone No.: 886-7-6414511

Emergency phone No./Fax No.: 886-7-6414511 Ext. 221 (on duty), 886-7-6414517 (off duty)/886-7-6423828

SECTION 2-HAZARDS IDENTIFICATION

GHS Classification:

Flammable Liquid Category 2
Acute Toxicity (Oral) Category 4
Skin Corrosion/ Irritation Category 2
Serious Eye Damage/ Eye Irritation Category 2
Specific Target Organ Toxicity Repeated Exposure Category 2
Hazardous To The Aquatic Environment (Acute) Category 3
Aspiration Hazard Category 1

GHS Label elements:

Hazard symbols



Signal word

Danger

Hazard statements

Highly flammable liquid and vapor
Harmful if inhaled
Causes skin irritation
Causes serious eye irritation
May cause damage to organs through prolonged or repeated exposure.
May cause long lasting harmful effects to aquatic life.
May be fatal if swallowed and enters airways.

Precautionary statements

Use only in well ventilated area.
Control of exposure by mechanical ventilation in an unventilated or confined space.
Avoid breathing vapors and contact with skin and eyes.
Wear breathing apparatus/protective gloves/face protection.
Store in well-ventilated place.
Disposal must be in accordance with applicable federal, state, or local regulations.

Other hazards: —

SECTION 3-COMPOSITION/INFORMATION ON INGREDIENTS

CAS No.	Chemical Name	wt% by weight	EINECS No.
00108-88-3	Toluene	97.0 min.	203-625-9
Synonyms	**Methylbenzol; Methylbenzene; Toluol; Phenylmethane**		

SECTION 4-FIRST AID MEASURES

Description of necessary first aid measures

Eye:

1. Flush immediately with warm water for at least 20 minutes.
2. Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
3. If pain persists or recurs seek medical attention.
4. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin:

1. Removing contaminated clothing, shoes, and leathery wearings, cleaning procedure is available before reused or waste treatment.
2. Washing affected area thoroughly with soap and water for at least 20 minutes.
3. Call a Physician if irritation develops or persists.

Ingestion:

1. If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomits.
2. If victim is conscious and alert, give 2～4 cupfuls of milk/water to dilute the substance in stomach.
3. Never give anything by mouth to an unconscious person.
4. Don't induce vomiting unless directed to do so by medical person.
5. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
6. Then seek for medical attention.

Inhalation:

1. Remove from further exposure and flush thoroughly with air.
2. Lay patient down. Keep warm and rested.
3. Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
4. If respiratory irritation, seek immediate medical assistance and call a physician.

Most important symptoms/effects, acute and delayed

Headache, fatigue, drowsiness, insomnia, anorexia and pain in limbs, nervousness, impairment of memory.

Indication of immediate medical attention and special treatment needed, if necessary

For acute or short term repeated exposures to toluene:

Inhalation:

1. Inhalation overexposure can produce toxic effects. Monitor for respiratory distress.
2. If cough or difficulty in breathing develops, evaluate for upper respiratory tract inflammation, bronchitis, and pneumonitis. Administer supplemental oxygen with assisted ventilation, as required.
3. This material (or a component) sensitizes the heart to the effects of sympathomimetic amines. Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in individuals exposed to this material.
4. Administration of sympathomimetic drugs should be avoided.

Ingestion:

1. If ingested, this material presents a significant aspiration and chemical pneumonitis hazard.
2. Induction of emesis is not recommended.
3. Consider activated charcoal and/or gastric lavage.
4. If patient is obtunded, protect the airway by cuffed endotracheal intubation or by placement of the body in a Trendelenburg and left lateral decubitus position.

SECTION 5-FIRE FIGHTING MEASURES

Extinguishing media

Foam、CO_2、Dry chemical、Water fog.

Specific hazards arising from the chemical

1. Liquid and vapor are highly flammable.
2. Severe fire hazard when exposed to heat, flame and/or oxidizers.
3. Vapor may travel a considerable distance to source of ignition.
4. Heating may cause expansion or decomposition leading to violent rupture of containers.
5. On combustion, may emit toxic fumes of carbon monoxide (CO).

Special protective equipment and precautions for fire-fighters

1. Firefighters must use full bunker gear including NIOSH-approved positive pressure self-contained breathing apparatus to protect against potential hazardous combustion or decomposition products and oxygen deficiencies.
2. Evacuate area and fight the fire from a maximum distance or use unmanned hose holders or monitor nozzles.
3. Cover pooling liquid with foam.
4. Containers can build pressure if exposed to radiant heat; cool adjacent containers with flooding quantities of water until well after the fire is out.
5. Withdraw immediately from the area if there is a rising sound from a venting safety device or discoloration of vessels, tanks, or pipelines.
6. Be aware that burning liquid will float on water.
7. Notify appropriate authorities of potential fire and explosion hazard if liquid enter sewers or waterways

SECTION 6-ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedure

1. Personal protective equipment (specified in Section 8)
   Eyes : Chemical safety goggles are recommended, and a face shield is added when needed.
   Skin : Wear appropriate protective gloves to avoid skin contact.
   Clothing: When direct contact is likely, use rubberized clothings, apron and boots.
   Respiratory : When limits are exceeded, wear a respirator approved by NIOSH/MSHA for protection against organic dust, mists and vapors.
2. Remove all sources of ignition. No smoking, naked lights or ignition sources. Ventilate area of leak or spill.
3. Keep unnecessary and unprotected personnel from entering. Evacuate personnel from the danger area. Consult with an expert about the emergency procedures.

Environmental precautions

1. Prevent spillage from entering drains, surface, and groundwater.
2. Contain and recover liquid when possible. Use non-sparking tools and equipment.
3. Collect liquid in an appropriate container or absorb with an inert material (e.g. vermiculite, dry sand, earth), and place in a chemical waste container.
4. Report the accidental spill/release to Local/State government.

Methods and materials for containment and cleaning up

Minor spill:

1. Remove all ignition sources.
2. Clean up all spills immediately.
3. Avoid breathing vapors and contact with skin and eyes.
4. Control personal contact by using protective equipment.
5. Contain and absorb small quantities with vermiculite or other absorbent material.
6. Wipe up.
7. Collect residues in a flammable waste container.

Major spill

1. Clear area of personnel and move upwind.
2. Alert emergency responders and tell them location and nature of hazard.
3. May be violently or explosively reactive.
4. Wear breathing apparatus plus protective gloves.
5. Prevent spillage from entering drains or water course.
6. No smoking, naked lights or ignition sources. Increase ventilation.
7. Stop leak if safe to do so.
8. Water spray or fog may be used to disperse/absorb vapor.
9. Contain spill with sand, earth or vermiculite.
10. Use only spark-free shovels and explosion proof equipment.
11. Collect recoverable product into labeled containers for recycling..
12. Absorb remaining product with sand, earth or vermiculite.
13. Collect solid residues and seal in labeled drums for disposal.
14. Wash area and prevent runoff into drains.
15. If contamination of drains or waterways occurs, advise emergency services.

SECTION 7-HANDLING AND STORAGE

Precautions for safe handling

1. Wash thoroughly after handling.
2. Use only in well ventilated area.
3. Ground and bond containers when transferring.
4. Use spark-free tools and explosion proof equipment.
5. Empty containers retain product residue (liquid/vapor), and can be dangerous.
6. Do not pressurize, cut, weld, braze, solder, drill, or expose empty containers to heat, sparks or open flames.

Conditions for safe storage, including any incompatibilities

1. Store in original containers in approved flame-proof area.
2. No smoking, naked lights, heat or ignition sources.
3. DO NOT store in pits, depressions, basements or areas where vapors may be trapped.
4. Keep containers securely sealed.
5. Store away from incompatible materials in a cool, dry well ventilated area.
6. Protect containers against physical damage and check regularly for leaks.
7. Keep containers tightly closed and store in a cool, dry, well-ventilated place, plainly labeled, and out of closed vehicles.
8. Ground all equipment containing this material.
9. Observe manufacturer's storing and handling recommendations.
10. Containers should be able to withstand pressures expected from warming and cooling in storage. This flammable liquid should be stored in a separate safety cabinet or room. A refrigerated room is preferable for materials with a flash point temperature lower than 70°F (21°C).

SECTION 8-EXPOSURE CONTROLS, PERSONAL PROTECTION

OSHA - Final PELs : 200 ppm TWA.
OSHA Ceiling : 300ppm.
ACGIH : 50 ppm, skin -potential forcutaneous absorption.
NIOSH : 100 ppm TWA; 375 mg/m^3 TWA; 500 ppm IDLH.
Taiwan TWA : 100 ppm (skin).
Taiwan STEL : 125 ppm (skin).
Taiwan Ceiling : -------.
Taiwan BEI : 1 mg/l (before on duty).

Engineering control

1. Process should be located at least 17 meter (50 feet) away from open flames and all high temperature operations likely to cause ignition of the styrene monomer vapor.
2. In venting styrene monomer vapors, consideration should be given to possible halogenation of the vapors by low concentrations of free chlorine and bromine with the resultant formation of lacrimations.
3. Process should be designed so that the operator is not exposed to direct contact with Toluene or the vapor. The technical problems of designing equipment, providing adequate ventilation and operating procedures which promise maximum security and economy, can best be handled by competent engineers.
4. It is essential for safety that equipment be used and maintained as recommended by the manufacturer.
5. Tanks used to store or process Toluene should be closed vessels vented to a safe point of discharge in the outside atmosphere away from operating stations, roadways, and at least 17 meter (50 feet) from possible sources of ignitions. All sparks, flames, heated surface, or other sources of ignition should be kept away from all vents. It is advisable, to provide suction on vessels when inspection or observation openings are made, to minimize or eliminate escape of vapors.

Personal protective equipment

Eye Protection:
Safety glasses equipped with side shields are recommended as minimum protection in industrial settings. Chemical goggles should be worn during transfer operations or when there is a likelihood of misting, splashing, or spraying of this material. A suitable emergency eye wash water and safety shower should be located near the work station.

Skin protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Clothing:
Avoid skin contact. Wear long-sleeved fire-retardant garments (e.g., Nomex®) while working with flammable and combustible liquids. Additional chemical-resistant protective gear may be required if splashing or spraying conditions exist. This may include an apron, boots and additional facial protection. If product comes in contact with clothing, immediately remove soaked clothing and shower. Promptly remove and discard contaminated leather goods.

Respirators:
For known vapor concentrations above the occupational exposure guidelines (see below), use a NIOSH-approved organic vapor respirator if adequate protection is provided. Protection factors vary depending upon the type of respirator used. Respirators should be used in accordance with OSHA requirements (29 CFR 1910.134). For airborne vapor concentrations that exceed the recommended protection factors for organic vapor respirators, use a full-face, positive-pressure, supplied air respirator. Due to fire and explosion hazards, do not enter atmospheres containing concentrations greater than 10% of the lower flammable limit of this product.

SECTION 9-PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Transparent liquid	Upper/lower explosive limits : 1.2%～7.1%
Odour : pleasant aromatic petroleum odour	Vapor Pressure : 22 mmHg @20℃/68℉
Odour threshold : 0.16～37 ppm (detect) 1.9～69 ppm (recognition)	Vapor Density : 3.1 (air=1)
PH : Not available	Relative density : 0.86 (water=1)
Melting/Freezing Point : －95 ℃	Solubility in water : 54～58 mg/100 ml
Initial boiling point/boiling range : 110.6 ℃	Partition coefficient : 2.73 (n-octanol/water)
Flash point : 4.4 ℃ (closed cup)	Auto-ignition temperature : 480℃
Evaporation Rate : 2.24 (BuAc=1)	Decomposition temperature : Not available
Flammability (solid/gas) : Not available	Viscosity : 0.6 mPa.s max @20℃
Molecular Formula : $C_6H_5CH_3$	Molecular Weight : 92.056

SECTION 10-STABILITY AND REACTIVITY

Reactivity
Vapor is explosive when exposed to heat or flame

Chemical stability
Stable at room temperature in closed containers under normal storage and handling conditions.

Possibility of hazardous reaction
Has not been reported.

Condition to avoid
Product is highly flammable – Keep away from sources of ignition. Avoid the higher temperatures. Keep away from open fire, heating elements and heat radiating surface and prevent from forming of the vapours mixtures with air in explosion limits.

Incompatible materials
Heat, flame, strong oxidizers, nitric and sulfuric acids, chlorine, nitrogen tetraoxide; will attack some forms of plastics, rubber, coatings.

Hazardous decomposition products
Carbon monoxide, carbon dioxide, hydrocarbons.

SECTION 11-TOXICOLOGICAL INFORMATION

Routes of exposure
Eye, Skin, inhalation, Ingestion.

Symptoms (treatments as indicated in Section 4)
Eye: The liquid produces a high level of eye discomfort and is capable of causing pain and severe conjunctivitis. Corneal injury may develop, with possible permanent impairment of vision, if not promptly and adequately treated. There is evidence that material may produce eye irritation in some persons and produce eye damage 24 hours or more after instillation. Severe inflammation may be expected with pain. There may be damage to the cornea. Unless treatment is prompt and adequate there may be permanent loss of vision. Conjunctivitis can occur following repeated exposure.

Skin: Contact with the material may damage the health of the individual; systemic effects may result following absorption. The material may cause moderate inflammation of the skin either following direct contact or after a delay of some time. Repeated exposure can cause contact dermatitis which is characterized by redness, swelling and blistering. Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

Ingestion: Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual. Swallowing of the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis; serious consequences may result. (ICSC13733). Considered an unlikely route of entry in commercial/industrial environments. The liquid may produce gastrointestinal discomfort and may be harmful if swallowed. Ingestion may result in nausea, pain and vomiting. Vomit entering the lungs by aspiration may cause potentially lethal chemical pneumonitis.

Inhalation: Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual. There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage. Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by sleepiness, reduced alertness, loss of reflexes, lack of co-ordination, and vertigo. Inhalation of high concentrations of gas/vapour causes lung irritation with coughing and nausea, central nervous depression with headache and dizziness, slowing of reflexes, fatigue and inco-ordination. If exposure to highly concentrated solvent atmosphere is prolonged this may lead to narcosis, unconsciousness, even coma and possible death. The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation.

Chronic exposure: There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment. Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.

Toxicity
LD50: <870 mg/kg (rat, oral)
LC50: 6000 ppm/6h (rat, inhalation)

Chronic effect
Carcinogenicity:
ACGIH : A4-Not classifiable as a Human Carcinogen.
OSHA : Possible select carcinogen.
IARC : Group 3 carcinogen.

Epide miology: Not available.

Teratogenicity: Teratogenic effects have occurred in experimental animals.

Reproductive Effects: Adverse reproductive effects have occurred in experimental animals.

Neurotoxicity: Not available.

Mutagenicity: Not available.

SECTION 12-ECOLOGICAL INFORMATION

Ecotoxicity
LC_{50} (96 hr.) Fish: 7.3～22.8 mg/l
EC_{50} (48 hr.) Water flea: —
Biocencentration factor (BCF): 1.67～380

Persistence and degradability
1. The material are expected to form a slick on the surface of waters after release in calm sea conditions. This is expected to evaporate and enter the atmosphere where it will be degraded through reaction with hydroxyl radicals.
2. Some of the material will become associated with benthic sediments, and it is likely to be spread over a fairly wide area of sea floor. Marine sediments may be either aerobic or anaerobic. The material, in probability, is biodegradable, under aerobic conditions. Evidence also suggests that the hydrocarbons may be degradable under anaerobic conditions although such degradation in benthic sediments may be a relatively slow process.
3. Under aerobic conditions the material will degrade to water and carbon dioxide, while under aerobic processes it will produce water, methane, carbon dioxide and carbon dioxide.
4. Based on test results, as well as theoretical considerations, the potential for bioaccumulation may be high. Toxic effects are often observed in species such as blue mussel, daphnia, freshwater green algae, marine copepods and amphipods.

Half-life (Air): 10～104 hr
Half-life (Surface water): 96～528 hr
Half-life (Ground water): 168～672 hr
Half-life (Soil): 96～528 hr

Bioaccumulative potential
This material is not expected to significantly bioaccumulate.

Mobility in soil: —

Other adverse effects: —

SECTION 13-DISPOSAL CONSIDERATIONS

Residues and spilled material are hazardous waste due to ignitability. Disposal must be in accordance with applicable federal, state, or local regulations.
The container for this product can present explosion or fire hazards, even when emptied. To avoid risk of injury, do not cut, puncture, or weld on or near this container. Since the emptied containers retain product residue, follow label warnings even after container is emptied.

SECTION 14-TRANSPORTATION INFORMATION

US DOT	Shipping Name	Toluene	Hazard Labels	
	Hazard Class	3		
	UN Number	1294		
	Packing Group	II		
Sea(IMO/IMDG)	Shipping Name	Toluene	Hazard Labels	
	Hazard Class	3.2		
	UN Number	1294		
	Packing Group	II		
	IMDG Code Page	3285		
	MARPOL	Not a DOT "Marine Pollutant" per 49 CFR 171.8.		
Air(ICAO/IATA)	Shipping Name	Toluene	Hazard Labels	
	Hazard Class	3.2		
	Subsidiary Class	1294		
	Packing Group	II		
RID/ ADR	No information available.			
Canadian TDG	Shipping Name	Toluene	Hazard Labels	
	Hazard Class	3		
	UN Number	1294		
	Packing Group	II		
	Subsidiary Class	9.2		

SECTION 15-REGULATORY INFORMATION

US FEDERAL

TSCA

CAS# 108-88-3 is listed on the TSCA inventory.

Health & Safety Reporting List

CAS# 108-88-3: Effective Date: 10/4/82; Sunset Date: 10/4/92

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

SARA

Section 302 (RQ)

CAS# 108-88-3 : final RQ = 1000 pounds (454 kg)

Section 302 (TPQ)

None of the chemicals in this material have a TPQ.

SARA Codes

CAS# 108-88-3 : acute, flammable.

Section 313

This material contains Toluene (CAS# 108-88-3, 99% & 100%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.

Clean Air Act

CAS# 108-88-3 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

Clean Water Act

CAS# 108-88-3 is listed as a Hazardous Substance under the CWA.
CAS# 108-88-3 is listed as a Priority Pollutant under the Clean Water Act.
CAS# 108-88-3 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

Toluene can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

WARNING: This product contains Toluene, a chemical known to the state of California to cause birth defects or other reproductive harm.

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: XN F
Risk Phrases : R 10 Flammable.
R 20 Harmful by inhalation.
Safety Phrases : S 9 Keep container in a well-ventilated place.
S 16 Keep away from sources of ignition - No smoking.
S 25 Avoid contact with eyes.
S 29 Do not empty into drains.
S 33 Take precautionary measures against static discharges.

WGK (Water Danger/Protection)

CAS# 108-88-3: 2

United Kingdom Occupational Exposure Limits

CAS# 108-88-3: OES-United Kingdom, TWA 50 ppm TWA; 191 mg/m3 TWA.
CAS# 108-88-3: OES-United Kingdom, STEL 150 ppm STEL; 574 mg/m3 STEL.

CANADA

CAS#100-42-5 is listed on Canada's DSL/NDSL list.
This product has a WHMIS classification of B2, D2A (99%)/B3, D2A (100%).
CAS# 105-05-5 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits

- CAS# 108-88-3: OEL-AUSTRALIA:TWA 100 ppm (375 mg/m3);STEL 150 ppm (560 mg/m3)
- OEL-BELGIUM:TWA 100 ppm (377 mg/m3);STEL 150 ppm (565 mg/m3)
- OEL-CZECHOSLOVAKIA:TWA 200 mg/m3;STEL 1000 mg/m3
- OEL-DENMARK:TWA 50 ppm (190 mg/m3);Skin
- OEL-FINLAND:TWA 100 ppm (375 mg/m3);STEL 150 ppm; Skin
- OEL-FRANCE:TWA 100 ppm (375 mg/m3);STEL 150 ppm (560 mg/m3)
- OEL-GERMANY:TWA 100 ppm (380 mg/m3)
- OEL-HUNGARY:TWA 100 mg/m3;STEL 300 mg/m3;Skin
- OEL-JAPAN:TWA 100 ppm (380 mg/m3)
- OEL-THE NETHERLANDS:TWA 100 ppm (375 mg/m3);Skin
- OEL-THE PHILIPPINES:TWA 100 ppm (375 mg/m3)
- OEL-POLAND:TWA 100 mg/m3
- OEL-RUSSIA:TWA 100 ppm; STEL 50 mg/m3
- OEL-SWEDEN:TWA 50 ppm (200 mg/m3);STEL 100 ppm (400 mg/m3);Skin
- OEL-SWITZERLAND:TWA 100 ppm (380 mg/m3);STEL 500 ppm
- OEL-THAILAND:TWA 200 ppm; STEL 300 ppm
- OEL-TURKEY:TWA 200 ppm (750 mg/m3)
- OEL-UNITED KINGDOM:TWA 100 ppm (375 mg/m3);STEL 150 ppm; Skin OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

SECTION 16-OTHER INFORMATION

References and sources

1. CHEMINFO Data Bank, CCINFO CD, 2005-3
2. HAZARD TEXT Data Bank, TOMES PLUS CD, Vol.65, 2005
3. RETECS Data Bank, TOMES CPS CD, Vol.65, 2005
4. HSDB Data Bank, TOMES CPS CD, Vol.65, 2005
5. Hazardous Substance Data Bank, Environment Protection, Administration, Executive Yuan, ROC (Taiwan)
6. Chemwatch Data Bank, 2005-1
7. SDS, GHS in Taiwan, Council of Labor Affairs, Executive Yuan, ROC (Taiwan)

Version	Date	Remark
Version 1	06/01/1998	Original Version.
Version 2	04/20/2001	Updated 10 sections to 16 sections.
Version 3	08/01/2003	Updated “SECTION 9-PHYSICAL AND CHEMICAL PROPERTIES”.
Version 4	01/01/2006	Updated “SECTION 14-TRANSPORTATION INFORMATION”.
Version 5	08/05/2008	Updated each section by GHS SDS.
Prepared by	Safety & Environment Protection Section, Taiwan SM Corporation Kaohsiung Plant.	

SAFETY DATA SHEET

Version 6.8
Revision Date 09/07/2024
Print Date 09/08/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : PCB No 28

Product Number : 35601
Brand : Sigma-Aldrich
Index-No. : 602-039-00-4
CAS-No. : 7012-37-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Specific target organ toxicity - repeated exposure (Category 2), H373
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

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For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word Warning

Hazard Statements

H373	May cause damage to organs through prolonged or repeated exposure.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary Statements

P260	Do not breathe dust.
P273	Avoid release to the environment.
P314	Get medical advice/ attention if you feel unwell.
P391	Collect spillage.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : 2,4,4'-Trichlorobiphenyl
2,4,4'-PCB

Formula : $C_{12}H_7Cl_3$
Molecular weight : 257.54 g/mol
CAS-No. : 7012-37-5
EC-No. : 230-293-2
Index-No. : 602-039-00-4

Component	Classification	Concentration
2,4,4'-Trichlorobiphenyl		
	STOT RE 2; Aquatic Acute 1; Aquatic Chronic 1; H373, H400, H410 Concentration limits: >= 0.005 %: STOT RE 2, H373; >= 0.005 %: STOT RE 2, H373; M-Factor - Aquatic Acute: 10 - Aquatic Chronic: 10	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

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SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

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SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid inhalation of dusts. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry.

Storage class
Storage class (TRGS 510): 11: Combustible Solids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

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Component	CAS-No.	Value	Control parameters	Basis
2,4,4'-Trichlorobiphenyl	7012-37-5	TWA	0.001 mg/m3	USA. NIOSH Recommended Exposure Limits
	Remarks	Potential Occupational Carcinogen		

8.2 Exposure controls

Appropriate engineering controls
Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with impervious gloves.

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter type P2
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer.
These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

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SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 56 °C (133 °F)
f)	Initial boiling point and boiling range	No data available
g)	Flash point	> 100.00 °C (> 212.00 °F)
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	No data available
	Relative density	No data available
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

No data available

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SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Violent reactions possible with:
strong oxidising agents

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: 1 - Group 1: Carcinogenic to humans (2,4,4'-Trichlorobiphenyl)

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

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Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
May cause damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

11.2 Additional Information

RTECS: DV8840000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - > 0.16 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - > 0.16 mg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

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SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 3432 Class: 9 Packing group: II
Proper shipping name: Polychlorinated biphenyls, solid
Reportable Quantity (RQ):
Marine pollutant: yes Poison Inhalation Hazard: No

IMDG
UN number: 3432 Class: 9 Packing group: II EMS-No: F-A, S-A
Proper shipping name: POLYCHLORINATED BIPHENYLS, SOLID
Marine pollutant : yes
Marine pollutant : yes

IATA
UN number: 3432 Class: 9 Packing group: II
Proper shipping name: Polychlorinated biphenyls, solid

SECTION 15: Regulatory information

CERCLA Reportable Quantity
This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : No SARA Hazards

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know
No components are subject to the Massachusetts Right to Know Act.

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Pennsylvania Right To Know

2,4,4'-Trichlorobiphenyl 7012-37-5

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

California Prop. 65

WARNING: This product can expose you to chemicals including 2,4,4'-Trichlorobiphenyl, which is/are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA : Product contains substance(s) not listed on TSCA inventory.

TSCA list

No substances are subject to a Significant New Use Rule.

The following substance(s) is/are subject to TSCA 12(b) export notification requirements:
2,4,4'-Trichlorobiphenyl 7012-37-5

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.8 Revision Date: 09/07/2024 Print Date: 09/08/2024

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SAFETY DATA SHEET

Issuing Date 03-Nov-2015 **Revision Date** 21-Jul-2015 **Revision Number** 1

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier

Product Number **601**
Product Name **Total Petroleum Hydrocarbons (TPH) in Water #2**
Synonyms None

Recommended use of the chemical and restrictions on use

Recommended Use Laboratory use only
Uses advised against No information available

Details of the supplier of the safety data sheet

Supplier ERA a Waters Company
Supplier Address 16341 Table Mountain Parkway, Golden, CO 80403 USA
Non-Emergency Telephone Number +1-303-431-8454
Supplier Email sdsinfo@waters.com

Emergency telephone number

Company Emergency Phone Number In case of EMERGENCY call CHEMTREC Day or Night
Within USA and Canada: 800-424-9300
International Call Collect: +1-703-527-3887

2. HAZARDS IDENTIFICATION

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

Skin corrosion/irritation	Category 1
Serious eye damage/eye irritation	Category 1

GHS Label elements, including precautionary statements

Emergency Overview

Signal word **Danger**

Hazard Statements
Causes severe skin burns and eye damage



Appearance Clear, colorless **Physical state** Liquid->Liquid **Odor** Odorless

Precautionary Statements - Prevention
Do not breathe dust/fume/gas/mist/vapors/spray
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
Precautionary Statements - Response
Immediately call a POISON CENTER or doctor/physician
Specific treatment (see supplemental first aid instructions on this label)

Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Immediately call a POISON CENTER or doctor/physician
Skin
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Immediately call a POISON CENTER or doctor/physician
Ingestion
IF SWALLOWED: Rinse mouth. DO NOT induce vomiting

Precautionary Statements - Storage
Store locked up
Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Not applicable
Unknown Toxicity
0 % of the mixture consists of ingredient(s) of unknown toxicity
Other information

No information available
Interactions with Other Chemicals
No information available.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Note: only the components contributing to the product's GHS hazard classification are listed in this section.

Chemical Name	CAS-No	Percent
Hydrochloric Acid	7647-01-0	0.09

4. FIRST AID MEASURES

First aid measures

General Advice	Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.
Eye contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Keep eye wide open while rinsing. Do not rub affected area. Remove contact lenses, if present and easy to do. Continue rinsing. Seek immediate medical attention/advice.
Skin contact	Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Seek immediate medical attention/advice.
Inhalation	Remove to fresh air. If breathing has stopped, give artificial respiration. Get medical attention immediately. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. If breathing is difficult, (trained personnel should) give oxygen. Delayed pulmonary edema may occur. Get medical attention immediately if symptoms occur.
Ingestion	Do NOT induce vomiting. Rinse mouth immediately and drink plenty of water. Never give anything by mouth to an unconscious person. Call a physician or poison control center immediately.
Self-protection of the first aider	Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination. Avoid contact with skin, eyes or clothing. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Use personal protective equipment as required. Wear personal protective clothing (see section 8).

Most important symptoms and effects, both acute and delayed

Most Important Symptoms and Effects Burning sensation.

Indication of any immediate medical attention and special treatment needed

Notes to Physician Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated. Do not give chemical antidotes. Asphyxia from glottal edema may occur. Marked decrease in blood pressure may occur with moist rales, frothy sputum, and high pulse pressure.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media

CAUTION: Use of water spray when fighting fire may be inefficient.

Specific hazards arising from the chemical

The product causes burns of eyes, skin and mucous membranes. Thermal decomposition can lead to release of irritating gases and vapors.

Uniform Fire Code Corrosive: Other--Liquid

Hazardous Combustion Products

Carbon oxides.

Explosion Data

Sensitivity to Mechanical Impact No.

Sensitivity to Static Discharge No.

Protective equipment and precautions for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions Attention! Corrosive material. Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Use personal protective equipment as required. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

Other Information Refer to protective measures listed in Sections 7 and 8.

Environmental precautions

Environmental precautions Refer to protective measures listed in Sections 7 and 8. Prevent further leakage or spillage if safe to do so. Should not be released into the environment. Do not allow to enter into soil/subsoil. Prevent product from entering drains.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Pick up and transfer to properly labeled containers. Soak up with inert absorbent material.

7. HANDLING AND STORAGE

Precautions for safe handling

Handling Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. In case of insufficient ventilation, wear suitable respiratory equipment. Use only with adequate ventilation and in closed systems. Do not eat, drink or smoke when using this product. Take off contaminated clothing and wash before reuse.

Conditions for safe storage, including any incompatibilities

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from moisture. Store locked up. Keep out of the reach of children. Store away from other materials.

Incompatible Products Acids. Bases. Oxidizing agent.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Hydrochloric Acid 7647-01-0	Ceiling: 2 ppm	(vacated) Ceiling: 5 ppm (vacated) Ceiling: 7 mg/m³ Ceiling: 5 ppm Ceiling: 7 mg/m³	IDLH: 50 ppm Ceiling: 5 ppm Ceiling: 7 mg/m³

Other Exposure Guidelines Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992)

Appropriate engineering controls

Engineering Measures Showers
Eyewash stations
Ventilation systems

Individual protection measures, such as personal protective equipment

Eye/face protection Face protection shield.
Skin and body protection Wear protective gloves and protective clothing. Long sleeved clothing. Chemical resistant apron. Impervious gloves.
Respiratory protection No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.
Hygiene Measures Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Wear suitable gloves and eye/face protection. Do not eat, drink or smoke when using this product. Take off contaminated clothing and wash before reuse. Contaminated work clothing should not be allowed out of the workplace. Regular cleaning of equipment, work area and clothing is recommended. Wash hands before breaks and immediately after handling the product. For environmental protection, remove and wash all contaminated protective equipment before re-use.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical and Chemical Properties

Physical state Liquid->Liquid
Appearance Clear, colorless
Color No information available
Odor Odorless
Odor Threshold No information available

Property	Values	Remarks Method
pH	<=2	None known
Melting / freezing point	no data available	None known
Boiling point / boiling range	no data available	None known
Flash Point	no data available	None known
Evaporation Rate	no data available	None known
Flammability (solid, gas)	no data available	None known
Flammability Limit in Air		None known
Upper flammability limit	no data available	
Lower flammability limit	no data available	
Vapor pressure	no data available	None known
Vapor density	no data available	None known
Specific Gravity	1	None known
Water Solubility	Soluble in water	None known
Solubility in other solvents	no data available	None known
Partition coefficient: n-octanol/water	no data available	None known
Autoignition temperature	no data available	None known
Decomposition temperature	no data available	None known
Kinematic viscosity	no data available	None known
Dynamic viscosity	no data available	None known

Explosive properties no data available
Oxidizing properties no data available

Other Information

Softening Point no data available
Particle Size no data available
Particle Size Distribution

10. STABILITY AND REACTIVITY

Reactivity

no data available.

Chemical stability
Stable under recommended storage conditions.
Possibility of Hazardous Reactions
None under normal processing.
Hazardous Polymerization
Hazardous polymerization does not occur.
Conditions to avoid
Exposure to air or moisture over prolonged periods.
Incompatible materials
Acids. Bases. Oxidizing agent.
Hazardous Decomposition Products
Carbon oxides.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information .

Inhalation Specific test data for the substance or mixture is not available. Corrosive by inhalation. (based on components). Inhalation of corrosive fumes/gases may cause coughing, choking, headache, dizziness, and weakness for several hours. Pulmonary edema may occur with tightness in the chest, shortness of breath, bluish skin, decreased blood pressure, and increased heart rate. Inhaled corrosive substances can lead to a toxic edema of the lungs. Pulmonary edema can be fatal. May cause irritation of respiratory tract.

Eye contact Specific test data for the substance or mixture is not available. Causes burns. (based on components). Corrosive to the eyes and may cause severe damage including blindness. Causes serious eye damage. May cause irreversible damage to eyes.

Skin contact Specific test data for the substance or mixture is not available. May cause irritation. Prolonged contact may cause redness and irritation.

Ingestion Specific test data for the substance or mixture is not available. Causes burns. (based on components). Ingestion causes burns of the upper digestive and respiratory tracts. May cause severe burning pain in the mouth and stomach with vomiting and diarrhea of dark blood. Blood pressure may decrease. Brownish or yellowish stains may be seen around the mouth. Swelling of the throat may cause shortness of breath and choking. May cause lung damage if swallowed. May be fatal if swallowed and enters airways. Ingestion may cause irritation to mucous membranes. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Component Information

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Hydrochloric Acid 7647-01-0	238 - 277 mg/kg (Rat)	> 5010 mg/kg (Rabbit)	= 1.68 mg/L (Rat) 1 h

Information on toxicological effects

Symptoms Erythema (skin redness). Burning. May cause blindness. Coughing and/ or wheezing.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Sensitization No information available.
Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Chemical Name	ACGIH	IARC	NTP	OSHA
Hydrochloric Acid 7647-01-0		Group 1 Group 3		X

Reproductive toxicity No information available.
STOT - single exposure No information available.
STOT - repeated exposure No information available.
Chronic toxicity No known effect based on information supplied. Chronic exposure to corrosive fumes/gases may cause erosion of the teeth followed by jaw necrosis. Bronchial irritation with chronic cough and frequent attacks of pneumonia are common. Gastrointestinal disturbances may also be seen.
Target Organ Effects Respiratory system. Eyes. Skin. Gastrointestinal tract (GI).
Aspiration Hazard No information available.

Numerical measures of toxicity Product Information
The following values are calculated based on chapter 3.1 of the GHS document
Not applicable

12. ECOLOGICAL INFORMATION

Ecotoxicity
Harmful to aquatic life.

Chemical Name	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Daphnia Magna (Water Flea)
Hydrochloric Acid 7647-01-0		96h LC50: = 282 mg/L (Gambusia affinis)		

Persistence and Degradability
No information available.
Bioaccumulation
No information available

Other adverse effects
No information available.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal methods This material, as supplied, is a hazardous waste according to federal regulations (40 CFR 261).
Contaminated Packaging Dispose of contents/containers in accordance with local regulations.
US EPA Waste Number D002

California Hazardous Waste Codes 791

14. TRANSPORT INFORMATION

DOT Not regulated
Proper Shipping Name NON REGULATED
Hazard Class N/A

TDG Not regulated

MEX Not regulated

ICAO Not regulated

IATA Not regulated
Proper Shipping Name NON REGULATED
Special Provisions None

IMDG Not regulated
Special Provisions None
Marine Pollutant Not applicable

RID Not regulated
Special Provisions None

ADR Not regulated
Special Provisions None

ADN Not regulated

15. REGULATORY INFORMATION

International Inventories

TSCA	Complies
DSL	All components are listed either on the DSL or NDSL.
ENCS	Contact supplier for inventory compliance status
KECL	Contact supplier for inventory compliance status
PICCS	Contact supplier for inventory compliance status
AICS	Contact supplier for inventory compliance status

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical Name	CAS-No	Percent	SARA 313 - Threshold Values %
Hydrochloric Acid - 7647-01-0	7647-01-0	0.09	1.0

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Hydrochloric Acid 7647-01-0	5000 lb			X

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level

pertaining to releases of this material

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs	RQ
Hydrochloric Acid 7647-01-0	5000 lb	5000 lb	RQ 5000 lb final RQ RQ 2270 kg final RQ

US State Regulations

California Proposition 65

This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

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International Regulations

Component	Carcinogen Status	Exposure Limits
Hydrochloric Acid 7647-01-0 (0.09)		Mexico: Ceiling 5 ppm Mexico: Ceiling 7 mg/m^3

Canada

WHMIS Hazard Class

Not determined

16. OTHER INFORMATION

NFPA	**Health Hazards** 3	**Flammability** 0	**Instability** 0	**Physical and Chemical Hazards** -
HMIS	**Health Hazards** 3	**Flammability** 0	**Physical Hazard** 0	**Personal Protection** X

Prepared By

Product Stewardship
23 British American Blvd.
Latham, NY 12110
1-800-572-6501

Issuing Date 03-Nov-2015

Revision Date 21-Jul-2015

Revision Note No information available

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

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End of Safety Data Sheet

SAFETY DATA SHEET
Xylene

SECTION 1: Identification of the substance/mixture and of the company/undertaking

Date issued 11.11.2013

1.1. Product identifier

Product name	Xylene
Chemical name	Xylene
Synonyms	Xylol, dimethyl benzene, xylenol
REACH Reg No.	01-2119488216-32-0000
CAS no.	1330-20-7
EC no.	215-535-7
Index no.	601-022-00-9
Article no.	13000000

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/preparation For the preparation of paints and as a solvent. General purpose cleaner.

1.3. Details of the supplier of the safety data sheet

Manufacturer

Company name	Fred Holmberg & Co AB
Office address	Geijersgatan 8
Postal address	Box 60056
Postcode	S-216 10
City	Limhamn
Country	Sweden
Tel	+46 (0)40 15 79 20
Fax	+46 (0)40 16 22 95
E-mail	info@holmberg.se
Website	http://www.holmberg.se/en/

1.4. Emergency telephone number

Emergency telephone 112 (Europe)

SECTION 2: Hazards identification

2.1. Classification of substance or mixture

Classification according to 67/548/EEC or 1999/45/EC	Xi; R38 Xn; R20/21 R10
Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]	Flam. Liq. 3; H226; Acute tox. 4; H312; Skin Irrit. 2; H315; Acute tox. 4; H332;

2.2. Label elements

Hazard Pictograms (CLP)



Signal word	Danger
Hazard statements	H226 Flammable liquid and vapour. H312 Harmful in contact with skin. H315 Causes skin irritation. H332 Harmful if inhaled.
Precautionary statements	P210 Keep away from heat/sparks/open flames/hot surfaces. – No smoking. P233 Keep container tightly closed. P243 Take precautionary measures against static discharge. P280 Wear protective gloves/protective clothing/eye protection/face protection. P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. P303 + P361 + P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. P331 Do NOT induce vomiting. P403 + P235 Store in a well-ventilated place. Keep cool.

2.3. Other hazards

Other hazards	Not known.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

Substance	Identification	Classification	Contents
Xylene	CAS no.: 1330-20-7 EC no.: 215-535-7 Index no.: 601-022-00-9	R10 Xn; R20/21 Xi; R38 Flam. Liq. 3; H226 Acute tox. 4; H332 Acute tox. 4; H312 Skin Irrit. 2; H315 Note : C	75 - 90 %
Ethylbenzene	CAS no.: 100-41-4 EC no.: 202-849-4 Index no.: 601-023-00-4 Synonyms: Ethylbenzene	F; R11 Xn; R20 Flam. Liq. 2; H225 Acute tox. 4; H332	10 - 25 %

Column headings	CAS no. = Chemical Abstracts Service; EU (Einecs or Elincs number) = European inventory of Existing Commercial Chemical Substances; Ingredient name = Name as specified in the substance list (substances that are not included in the substance list must be translated, if possible). Contents given in; %, %wt/wt, %vol/wt, %vol/vol, mg/m3, ppb, ppm, weight%, vol%
HH/HF/HE	T+ = Very toxic, T = Toxic, C = Corrosive, Xn = Harmful, Xi = Irritating, E = Explosive, O = Oxidizing, F+ = Extremly flammable, F = Very flammable, N = Environmental hazard

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation	Move the exposed person to fresh air at once. Get medical attention if any discomfort continues.
Skin contact	Remove contaminated clothes and rinse skin thoroughly with water.
Eye contact	Immediately flush with plenty of water for up to 15 minutes. Remove any contact lenses and open eyes wide apart. Get medical attention if any discomfort continues.
Ingestion	NEVER MAKE AN UNCONSCIOUS PERSON VOMIT OR DRINK FLUIDS! Do not induce vomiting. Rinse mouth with water. Get medical attention.

4.2. Most important symptoms and effects, both acute and delayed

Information for health personnel	Treat Symptomatically. Do not give victim anything to drink if he is

unconscious.

4.3. Indication of any immediate medical attention and special treatment needed

Specific details on antidotes	No recommendation given.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	Extinguish with alcohol-resistant foam, carbon dioxide, dry powder or water fog.

5.2. Special hazards arising from the substance or mixture

Fire and explosion hazards	Solvent vapours may form explosive mixtures with air.
Hazardous combustion products	Fire creates: Carbon monoxide (CO). Carbon dioxide (CO2).

5.3. Advice for firefighters

Fire fighting procedures	No specific fire fighting procedure given.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal protection measures	Ensure suitable personal protection (including respiratory protection) during removal of spillages in a confined area. Ventilate well. Stop leak if possible without risk. Avoid contact with skin and eyes. Do not breathe vapour.

6.2. Environmental precautions

Environmental precautionary measures	Avoid discharge into drains, water courses or onto the ground.

6.3. Methods and material for containment and cleaning up

Cleaning method	Dam and absorb spillages with sand, earth or other non-combustible material.

6.4. Reference to other sections

Other instructions	No recommendation given.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Handling	Keep away from heat, sparks and open flame. Take precautionary measures against static discharges. Mechanical ventilation may be required.

Protective Safety Measures

Advice on general occupational hygiene	Provide easy access to water supply and eye wash facilities.

7.2. Conditions for safe storage, including any incompatibilities

Storage	Keep away from heat, sparks and open flame. Ground container and transfer equipment to eliminate static electric sparks. Store in a cool and well-ventilated place.

7.3. Specific end use(s)

Specific use(s)	Not entered.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

DNEL / PNEC

Method of testing	Contents
DNEL	Group: Industrial Exposure route: Inhalation Exposure frequency: Short term (acute) Critical Component: Etylbenzen Value: 289 mg/kg/dag

DNEL	Group: Industrial Exposure route: Inhalation Exposure frequency: Long term (repeated) Critical Component: Etylbenzen Type of effect: Systemic effect Value: 77 mg/kg/dag
DNEL	Group: Industrial Exposure route: Dermal Exposure frequency: Long term (repeated) Critical Component: Etylbenzen Type of effect: Systemic effect Value: 180 mg/kg/dag
DNEL	Group: Consumer Exposure route: Inhalation Exposure frequency: Long term (repeated) Critical Component: Etylbenzen Type of effect: Systemic effect Value: 14,8 mg/kg/dag
DNEL	Group: Consumer Exposure route: Dermal Exposure frequency: Long term (repeated) Critical Component: Etylbenzen Type of effect: Systemic effect Value: 108 mg/kg/dag
DNEL	Group: Consumer Exposure route: Oral Exposure frequency: Long term (repeated) Critical Component: Etylbenzen Type of effect: Systemic effect Value: 1,6 mg/kg/dag
DNEL	Group: Industrial Exposure route: Inhalation Exposure frequency: Short term (acute) Critical Component: xylen Value: 442 mg/kg/dag
DNEL	Group: Industrial Exposure route: Inhalation Exposure frequency: Long term (repeated) Critical Component: xylen Type of effect: Systemic effect Value: 221 mg/kg/dag
DNEL	Group: Industrial Exposure route: Dermal Exposure frequency: Long term (repeated) Critical Component: xylen Type of effect: Systemic effect Value: 3182 mg/kg/dag
DNEL	Group: Consumer Exposure route: Inhalation Exposure frequency: Short term (acute) Critical Component: xylen Value: 260 mg/kg/dag
DNEL	Group: Consumer Exposure route: Inhalation Exposure frequency: Long term (repeated) Critical Component: xylen Type of effect: Systemic effect

	Value: 65,3 mg/kg/dag
DNEL	Group: Consumer Exposure route: Dermal Exposure frequency: Long term (repeated) Critical Component: xylen Type of effect: Systemic effect Value: 1872 mg/kg/dag
DNEL	Group: Consumer Exposure route: Oral Exposure frequency: Long term (repeated) Critical Component: xylen Type of effect: Systemic effect Value: 12,5 mg/kg/dag
Exposure guidelines	Country of origin: Sverige Limit value type: NGV 200 mg/m3 OEL Short Term Value: 450 mg/m3 Source: Nationella hygieniska gränsvärden, AFS 2005:17
Other Information	Ovanstående NGV resp. KTV gäller både xylen och etylbenzen

8.2. Exposure controls

Occupational exposure limits: Provide adequate ventilation. Observe Occupational Exposure Limits and minimise the risk of inhalation of vapours. Protective gloves and goggles are recommended. Provide eyewash, quick drench.

Safety signs



Respiratory protection

Respiratory protection: Respiratory protection must be used if air contamination exceeds acceptable level. Use respiratory equipment with gas filter, type A2.

Hand protection

Hand protection: Use protective gloves. Chemical resistant gloves required for prolonged or repeated contact. Gloves of nitrile rubber, PVA or Viton are recommended.

Eye / face protection

Eye protection: Use safety goggles or face shield in case of splash risk.

Skin protection

Skin protection (except hands): Wear appropriate clothing to prevent any possibility of skin contact.

Hygiene / Environmental

Specific hygiene measures: Wash hands after contact.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	Fluid.
Colour	Colourless.
Odour	Aromatic.
Comments, pH (as supplied)	Not relevant.
Melting point/melting range	Value: < -48 °C
Boiling point / boiling range	Value: 136-145 °C
Flash point	Value: 27 °C
Evaporation rate	Value: 13,5
Explosion limit	Value: 1-7,1 %
Vapour pressure	Value: 1 kPa Test temperature: 20 °C

Vapour density	Value: 3,7
Specific gravity	Value: 0,870 kg/m3 Test temperature: 20 °C
Solubility description	Soluble in: Organic solvents. Not soluble in water.
Partition coefficient: n-octanol/water	Value: 3,15
Spontaneous combustability	Value: > 432-530 °C
Viscosity	Value: < 0,90 mPas Method of testing: Kinematisk Test temperature: 25 °C

9.2. Other information

SECTION 10: Stability and reactivity

10.1. Reactivity

Reactivity: Heating may cause a fire.

10.2. Chemical stability

Stability: Stable under the prescribed storage conditions.

10.3. Possibility of hazardous reactions

Possibility of hazardous reactions: Not known.

10.4. Conditions to avoid

Conditions to avoid: Avoid heat, flames and other sources of ignition.

10.5. Incompatible materials

Materials to avoid: Avoid contact with oxidising agents (e.g. nitric acid, peroxides and chromates). Strong acids.

10.6. Hazardous decomposition products

Hazardous decomposition products: Fire creates: Carbon monoxide (CO). Carbon dioxide (CO_2).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Toxicological Information:

Other toxicological data: Acute Toxicity (Oral LD50): mg/kg (oral rat) > 2000
Acute Toxicity (Inhalation LC50): mg/l (vapours) (4h) > 20
Acute Toxicity (Dermal LD50): mg/kg Rabbit > 2000

Toxicological data for substances

Potential acute effects

Inhalation	In high concentrations, vapours are narcotic and may cause headache, fatigue, dizziness and nausea. Icke klassificerad som aspirationstoxisk (Not classified as asp. tox.)
Skin contact	Prolonged or frequent contact may cause redness, itching, eczema and skin cracking. Defats the skin.
Eye contact	May irritate and cause redness and pain.
Ingestion	Ingestion of large amounts may cause unconsciousness. However, ingestion may cause nausea, headache, dizziness and intoxication. Ingestion may cause irritation of the gastrointestinal tract, vomiting and diarrhoea. May cause irritation to the mouth and throat.

Delayed effects / repeated exposure

Sensitisation	Not known.
Chronic effects	None known.

Carcinogenic, Mutagenic or Reprotoxic

Carcinogenicity	None.
Mutagenicity	Not known.
Teratogenic properties	Suspected of damaging the unborn child

Reproductive toxicity	Not known.

SECTION 12: Ecological information

12.1. Toxicity

Acute aquatic, fish	Value: 2 mg/l Method of testing: LC50 Fish, species: Roccus saxatilis Duration: 96h
Acute aquatic, algae	Value: > 3,2 mg/l Method of testing: IC50 Algae, species: Selenastrum Capricornum Duration: 72h
Acute aquatic, Daphnia	Value: 8,5 mg/l Method of testing: EC50 Daphnia, species: Daphnia magna Duration: 48h

12.2. Persistence and degradability

Persistence and degradability description	Lättnedbrytbar av biologiska organismer.
Chemical oxygen demand (COD)	Value: 5 Method of testing: COD
Biological oxygen demand (BOD)	Value: 0,55 Method of testing: BOD

12.3. Bioaccumulative potential

Bioaccumulative potential	Will not bio-accumulate.
Bioconcentration factor (BCF)	Value: 22 Method of testing: BCF

12.4. Mobility in soil

Mobility	The product is insoluble in water and will spread on the water surface.

12.5. Results of PBT and vPvB assessment

PBT assessment results	This substance is not classified as PBT or vPvB.

12.6. Other adverse effects

Other adverse effects / Remarks	None known.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Specify the appropriate methods of disposal	Confirm disposal procedures with environmental engineer and local regulations. Absorb in vermiculite or dry sand and dispose of at a licenced hazardous waste collection point. Liquid components can be disposed of by incineration.
Product classified as hazardous waste	Yes
Packaging classified as hazardous waste	Yes

SECTION 14: Transport information

14.1. UN number

ADR	1307
RID	1307
IMDG	1307
ICAO/IATA	1307

14.2. UN proper shipping name

ADR	XYLENES

RID	XYLENES
IMDG	XYLENES
ICAO/IATA	XYLENES

14.3. Transport hazard class(es)

ADR	3
Hazard no.	30
RID	3
ADN	33
IMDG	3
ICAO/IATA	3

14.4. Packing group

ADR	III
RID	III
IMDG	III
ICAO/IATA	III

14.5. Environmental hazards

Comment	Not relevant.

14.6. Special precautions for user

EmS	F-E, S-D

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

SECTION 15: Regulatory information

EC no.	215-535-7

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Other Label Information	Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 with amendments.
Legislation and regulations	Dangerous Substance Directive 67/548/EEC. The Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 (S.I 2009 No. 716). The List of Wastes (England) (Amendment) Regulations 2005. (SI 2005 No. 895). Avfallsförordningen (2011:927).

15.2. Chemical safety assessment

SECTION 16: Other information

Hazard symbol



R-phrases	R10 Flammable. R38 Irritating to skin. R20/22 Harmful by inhalation and if swallowed. R38 Irritating to skin.
S-phrases	S7 Keep container tightly closed. S16 Keep away from sources of ignition - No smoking.
Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]	Flam. Liq. 3; H226; Acute tox. 4; H312; Skin Irrit. 2; H315;

	Acute tox. 4; H332;
List of relevant R-phrases (under headings 2 and 3).	R38 Irritating to skin. R11 Highly flammable. R10 Flammable. R20/21 Harmful by inhalation and in contact with skin. R20 Harmful by inhalation.
List of relevant H-phrases (Section 2 and 3).	H332 Harmful if inhaled. H312 Harmful in contact with skin. H225 Highly flammable liquid and vapour. H226 Flammable liquid and vapour. H315 Causes skin irritation.
Responsible for safety data sheet	Fred Holmberg & Co AB

SAFETY DATA SHEET

Version 4.10
Revision Date 05/27/2016
Print Date 01/23/2017

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : *trans*-1,2-Dichloroethene

Product Number : 48527
Brand : Supelco
Index-No. : 602-026-00-3

CAS-No. : 156-60-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Acute toxicity, Inhalation (Category 4), H332
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H332 Harmful if inhaled.
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.

P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : *trans*-1,2-Dichloroethene
trans-1,2-Dichloroethylene
trans-Acetylene dichloride

Formula : $C_2H_2Cl_2$
Molecular weight : 96.94 g/mol
CAS-No. : 156-60-5
EC-No. : 205-860-2
Index-No. : 602-026-00-3

Hazardous components

Component	Classification	Concentration
trans-Dichloroethylene		
	Flam. Liq. 2; Acute Tox. 4; Aquatic Acute 3; Aquatic Chronic 3; H225, H332, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Recommended storage temperature 2 - 8 °C

Light sensitive. Air and moisture sensitive. Refrigerate before opening.
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
trans-Dichloroethylene	156-60-5	TWA	200.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Eye irritation		

		TWA	200.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Eye irritation		
		TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Eye irritation		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: light yellow
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -50 °C (-58 °F) - lit.
f)	Initial boiling point and boiling range	48 °C (118 °F) - lit.
g)	Flash point	6.0 °C (42.8 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or	Upper explosion limit: 12.8 %(V) Lower explosion limit: 9.7 %(V)

	explosive limits	
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.257 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Oxidizing agents, Bases

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 1,235 mg/kg

LD50 Oral - Mouse - 2,122 mg/kg
Remarks: Behavioral:Altered sleep time (including change in righting reflex). Behavioral:Somnolence (general depressed activity). Behavioral:Ataxia.

LC50 Inhalation - Rat - 24100 ppm
Remarks: Behavioral:Somnolence (general depressed activity).

LD50 Dermal - Rabbit - > 5,000 mg/kg
Remarks: Prolonged skin contact may cause skin irritation and/or dermatitis. Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

prolonged or repeated exposure can cause:, narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Kidney -

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 220.00 mg/l - 48 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

IMDG

UN number: 1150 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: 1,2-DICHLOROETHYLENE

IATA

UN number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Fire Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
trans-Dichloroethylene	156-60-5	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
trans-Dichloroethylene	156-60-5	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
trans-Dichloroethylene	156-60-5	1993-04-24

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H332	Harmful if inhaled.
H402	Harmful to aquatic life.

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.10 Revision Date: 05/27/2016 Print Date: 01/23/2017

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Version 6.2
Revision Date 23.06.2020
Print Date 19.06.2021
GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name	:	trans-Chlordane
Product Number	:	ERC-004
Brand	:	Cerilliant
REACH No.	:	A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.	:	5103-74-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	:	Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Sigma-Aldrich Inc. 3050 SPRUCE ST ST. LOUIS MO 63103 UNITED STATES
Telephone	:	+1 314 771-5765
Fax	:	+1 800 325-5052

1.4 Emergency telephone

Emergency Phone #	:	800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 4), H332
Carcinogenicity (Category 2), H351
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

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Pictogram	
Signal word	Danger
Hazard statement(s)	
H301	Toxic if swallowed.
H332	Harmful if inhaled.
H351	Suspected of causing cancer.
H410	Very toxic to aquatic life with long lasting effects.
Precautionary statement(s)	
P201	Obtain special instructions before use.
P273	Avoid release to the environment.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
Supplemental Hazard Statements	none

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

Molecular weight	:	409,78 g/mol
CAS-No.	:	5103-74-2
EC-No.	:	225-826-0

Component	Classification	Concentration
trans-Chlordane		
	Acute Tox. 3; Acute Tox. 4; Carc. 2; Aquatic Acute 1; Aquatic Chronic 1; H301, H332, H351, H400, H410 M-Factor - Aquatic Acute: 10	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice

Consult a physician. Show this material safety data sheet to the doctor in attendance.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

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In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

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7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Store in cool place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of Regulation (EU) 2016/425 and the standard EN 374 derived from it.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: crystalline Color: white
b)	Odor	odorless

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c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Relative density	1,590 g/cm3
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available

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Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 200 mg/kg
LD50 Oral - Mouse - 145 mg/kg
Inhalation: (Regulation (EC) No 1272/2008, Annex VI)

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity

Carcinogenicity
Suspected of causing cancer.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (trans-Chlordane)

Reproductive toxicity

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 0,044 mg/l - 96,0 h Remarks: (in analogy to similar products)
	LOEC - Pimephales promelas (fathead minnow) - 0,025 mg/l - 48,0 h Remarks: (in analogy to similar products)

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Toxicity to daphnia and other aquatic invertebrates	LOEC - Daphnia magna (Water flea) - 0,07 mg/l - 48 h Remarks: (in analogy to similar products)
	LC50 - Daphnia magna (Water flea) - 0,0984 mg/l - 48 h Remarks: (in analogy to similar products)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
Very toxic to aquatic life with long lasting effects.
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Waste material must be disposed of in accordance with the Directive on waste 2008/98/EC as well as other national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number
ADR/RID: 3077 IMDG: 3077 IATA: 3077

14.2 UN proper shipping name
ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (trans-Chlordane)
IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (trans-Chlordane)
IATA: Environmentally hazardous substance, solid, n.o.s. (trans-Chlordane)

14.3 Transport hazard class(es)
ADR/RID: 9 IMDG: 9 IATA: 9

14.4 Packaging group
ADR/RID: III IMDG: III IATA: III

14.5 Environmental hazards
ADR/RID: yes IMDG Marine pollutant: yes IATA: yes

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14.6 Special precautions for user

No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

This material safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical Safety Assessment

For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H301	Toxic if swallowed.
H332	Harmful if inhaled.
H351	Suspected of causing cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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SAFETY DATA SHEET

Version 4.6
Revision Date 03/02/2015
Print Date 02/18/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Trichloroethylene

Product Number : 251402
Brand : Sigma-Aldrich
Index-No. : 602-027-00-9

CAS-No. : 79-01-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Germ cell mutagenicity (Category 2), H341
Carcinogenicity (Category 1B), H350
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H336 May cause drowsiness or dizziness.
H341 Suspected of causing genetic defects.
H350 May cause cancer.
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear eye protection/ face protection.
P280	Wear protective gloves.
P281	Use personal protective equipment as required.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	TCE Trichloroethene
Formula	:	C_2HCl_3
Molecular weight	:	131.39 g/mol
CAS-No.	:	79-01-6
EC-No.	:	201-167-4
Index-No.	:	602-027-00-9

Hazardous components

Component	Classification	Concentration
Trichloroethylene Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)		
	Skin Irrit. 2; Eye Irrit. 2A; Muta. 2; Carc. 1B; STOT SE 3; Aquatic Acute 3; Aquatic Chronic 3; H315, H319, H336, H341, H350, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Light sensitive. Handle and store under inert gas.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Trichloroethylene	79-01-6	TWA	10.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment cognitive decrement Renal toxicity Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen		
		STEL	25.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment cognitive decrement Renal toxicity Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Suspected human carcinogen		
		Potential Occupational Carcinogen See Appendix C See Appendix A		
		See Table Z-2		
		TWA	100.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.19-1967		
		CEIL	200.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.19-1967		
		Peak	300.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.19-1967		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Trichloroethylene	79-01-6	Trichloroacetic acid	15.0000 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		Trichloroethanol	0.5000 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			
		Trichloroethylene		In blood	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			
		Trichloroethylene		In end-exhaled air	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -84.8 °C (-120.6 °F) - lit.
f)	Initial boiling point and boiling range	86.7 °C (188.1 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower	Upper explosion limit: 10.5 %(V)

	flammability or explosive limits	Lower explosion limit: 8 %(V)
k)	Vapour pressure	81.3 hPa (61.0 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.463 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 2.29log Pow: 5
p)	Auto-ignition temperature	410.0 °C (770.0 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Oxidizing agents, Strong bases, Magnesium

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 4,920 mg/kg

LC50 Inhalation - Mouse - 4 h - 8450 ppm

LD50 Dermal - Rabbit - > 20,000 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Severe skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation - 24 h

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.
In vitro tests showed mutagenic effects

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC:	1 - Group 1: Carcinogenic to humans (Trichloroethylene)
NTP:	Reasonably anticipated to be a human carcinogen (Trichloroethylene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: KX4550000

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Exposure to and/or consumption of alcohol may increase toxic effects., Gastrointestinal disturbance, Kidney injury may occur., narcosis
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 41 mg/l - 96.0 h
	LOEC - other fish - 11 mg/l - 10.0 d
	NOEC - Oryzias latipes - 40 mg/l - 10.0 d
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 18.00 mg/l - 48 h
Toxicity to algae	IC50 - Pseudokirchneriella subcapitata (green algae) - 175.00 mg/l - 96 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Does not bioaccumulate.

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1710 Class: 6.1 Packing group: III
Proper shipping name: Trichloroethylene
Reportable Quantity (RQ): 100 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1710 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TRICHLOROETHYLENE

IATA
UN number: 1710 Class: 6.1 Packing group: III
Proper shipping name: Trichloroethylene

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Trichloroethylene	79-01-6	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Trichloroethylene	79-01-6	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Trichloroethylene	79-01-6	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Trichloroethylene	79-01-6	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Trichloroethylene	CAS-No. 79-01-6	Revision Date 2011-09-01
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.	CAS-No. 79-01-6	Revision Date 2011-09-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H402	Harmful to aquatic life.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.6 Revision Date: 03/02/2015 Print Date: 02/18/2016

SAFETY DATA SHEET

Version 4.17
Revision Date 03/03/2015
Print Date 02/19/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Trichlorofluoromethane

Product Number : 254991
Brand : Aldrich

CAS-No. : 75-69-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Dermal (Category 4), H312

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Warning

Hazard statement(s)
H312 Harmful in contact with skin.

Precautionary statement(s)
P280 Wear protective gloves/ protective clothing.
P302 + P352 + P312 IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or doctor/ physician if you feel unwell.
P363 Wash contaminated clothing before reuse.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : Fluorotrichloromethane
CFC-11

Formula	:	CCl_3F CCl_3F
Molecular weight	:	137.37 g/mol
CAS-No.	:	75-69-4
EC-No.	:	200-892-3

Hazardous components

Component	Classification	Concentration
Trichlorofluoromethane		
	Acute Tox. 4; H312	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas, Hydrogen fluoride

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature 2 - 8 °C

Contents under pressure.
Storage class (TRGS 510): Non Combustible Liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Trichlorofluoromethane	75-69-4	C	1,000.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Cardiac sensitization Not classifiable as a human carcinogen		
		C	1,000.000000 ppm 5,600.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1,000.000000 ppm 5,600.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 480 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm
Break through time: 30 min

Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	-110.99 - -109.99 °C (-167.78 - -165.98 °F)
f)	Initial boiling point and boiling range	23.7 °C (74.7 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	885.7 hPa (664.3 mmHg) at 20.0 °C (68.0 °F) 2,701.2 hPa (2,026.1 mmHg) at 55.0 °C (131.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.494 g/cm3 at 25 °C (77 °F)
n)	Water solubility	1 g/l
o)	Partition coefficient: n-octanol/water	log Pow: 2.53
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available

t) Oxidizing properties No data available

9.2 Other safety information

Surface tension 18.0 mN/m at 25.0 °C (77.0 °F)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Sodium/sodium oxides, Potassium, Magnesium, Aluminum, Zinc

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - > 15,000 mg/kg

LC50 Inhalation - Rat - 0.3 h - 130000 ppm
Remarks: Behavioral:Tremor. Behavioral:Convulsions or effect on seizure threshold. Respiratory disorder

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: PB6125000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated., Nausea, Dizziness, Headache, Vomiting, Diarrhoea, Abdominal pain, Weakness, Unconsciousness

Liver -

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3082 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, liquid, n.o.s. (Trichlorofluoromethane)
Reportable Quantity (RQ): 5000 lbs

Poison Inhalation Hazard: No

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Trichlorofluoromethane	75-69-4	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Trichlorofluoromethane	75-69-4	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Trichlorofluoromethane	75-69-4	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Trichlorofluoromethane	75-69-4	2007-07-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
H312	Harmful in contact with skin.

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	1
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.17 Revision Date: 03/03/2015 Print Date: 02/19/2016

SAFETY DATA SHEET
CHROMIUM HARD,TRIVALENT

1. Identification

Product identifier

Product name CHROMIUM HARD,TRIVALENT

Product number 2403

Recommended use of the chemical and restrictions on use

Application Industrial Use

Details of the supplier of the safety data sheet

Supplier

SIFCO Applied Surface Concepts
5708 E. Schaaf Road
Independence, Ohio 44131
U.S.A.
Tel.: +1 216-524-0099
Fax: +1 216-524-6331
E-Mail: info@sifcoasc.com

Emergency telephone number

Emergency telephone CHEMTREC (United States) (800) 424-9300; CHEMTREC (International) +1 703-527-3887

2. Hazard(s) identification

Classification of the substance or mixture

Physical hazards Not Classified

Health hazards Skin Corr. 1B - H314 Eye Dam. 1 - H318 STOT SE 3 - H335

Environmental hazards Aquatic Acute 3 - H402

Label elements

Pictogram



Signal word Danger

Hazard statements H314 Causes severe skin burns and eye damage.
H335 May cause respiratory irritation.
H402 Harmful to aquatic life.

CHROMIUM HARD,TRIVALENT

Precautionary statements

P260 Do not breathe vapor/ spray.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P304+P340 If inhaled: Remove person to fresh air and keep comfortable for breathing.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P363 Wash contaminated clothing before reuse.
P403+P233 Store in a well-ventilated place. Keep container tightly closed.
P501 Dispose of contents/ container in accordance with national regulations.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P284 [In case of inadequate ventilation] wear respiratory protection.
P301+P310 If swallowed: Immediately call a poison center/ doctor.
P302+P352 If on skin: Wash with plenty of water.

Contains AMMONIUM FORMATE, CHROMIUM (III) SULPHATE, AMMONIA ...%

Other hazards

This product does not contain any substances classified as PBT or vPvB.

3. Composition/information on ingredients

Mixtures

AMMONIUM FORMATE **25-30%**

CAS number: 540-69-2

Classification
Skin Irrit. 2 - H315
Eye Irrit. 2 - H319
STOT SE 3 - H335

AMMONIUM CHLORIDE **5-10%**

CAS number: 12125-02-9

Classification
Acute Tox. 4 - H302
Eye Irrit. 2 - H319

CHROMIUM (III) SULPHATE **5-10%**

CAS number: 10101-53-8

Classification
Acute Tox. 4 - H302
Acute Tox. 4 - H312
Acute Tox. 4 - H332
Skin Corr. 1B - H314
Eye Dam. 1 - H318
STOT SE 3 - H335

CHROMIUM HARD,TRIVALENT

Potassium Sulfate	**1-5%**
CAS number: 7778-80-5	
Classification Not Classified	

AMMONIA ...%	**1-5%**
CAS number: 1336-21-6 M factor (Acute) = 1	
Classification Skin Corr. 1B - H314 Eye Dam. 1 - H318 STOT SE 3 - H335 Aquatic Acute 1 - H400	

SODIUM BROMIDE	**<1%**
CAS number: 7647-15-6	
Classification Acute Tox. 4 - H312	

The full text for all hazard statements is displayed in Section 16.

4. First-aid measures

Description of first aid measures

Inhalation Move affected person to fresh air at once. Get medical attention.

Ingestion Get medical attention immediately. Do not induce vomiting.

Skin Contact Remove contaminated clothing immediately and wash skin with soap and water. Continue to rinse for at least 15 minutes and get medical attention.

Eye contact Remove affected person from source of contamination. Rinse immediately with plenty of water. Continue to rinse for at least 15 minutes and get medical attention.

Most important symptoms and effects, both acute and delayed

Inhalation Coughing, chest tightness, feeling of chest pressure.

Ingestion May cause chemical burns in mouth and throat. May cause stomach pain or vomiting.

Skin contact May cause serious chemical burns to the skin.

Eye contact Causes severe burns. May cause serious eye damage.

Indication of immediate medical attention and special treatment needed

Notes for the doctor No specific recommendations.

5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media The product is not flammable. Use fire-extinguishing media suitable for the surrounding fire.

Special hazards arising from the substance or mixture

CHROMIUM HARD,TRIVALENT

Specific hazards Corrosive gases or vapors.

Advice for firefighters

Protective actions during firefighting Wear positive-pressure self-contained breathing apparatus (SCBA) and appropriate protective clothing.

Special protective equipment for firefighters Use protective equipment appropriate for surrounding materials.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Personal precautions Follow precautions for safe handling described in this safety data sheet. Avoid inhalation of vapors. Provide adequate general and local exhaust ventilation.

Environmental precautions

Environmental precautions Do not discharge into drains or watercourses or onto the ground. Inform the relevant authorities if environmental pollution occurs (sewers, waterways, soil or air).

Methods and material for containment and cleaning up

Methods for cleaning up Wear suitable protective equipment, including gloves, goggles/face shield, respirator, boots, clothing or apron, as appropriate. Flush contaminated area with plenty of water. Avoid the spillage or runoff entering drains, sewers or watercourses. Collect and dispose of spillage as indicated in Section 13. Wash thoroughly after dealing with a spillage.

Reference to other sections Wear protective clothing as described in Section 8 of this safety data sheet. See Section 11 for additional information on health hazards. See Section 12 for additional information on ecological hazards. For waste disposal, see Section 13.

7. Handling and storage

Precautions for safe handling

Usage precautions Avoid spilling. Avoid contact with skin and eyes. Avoid inhalation of vapors and spray/mists. Provide adequate general and local exhaust ventilation.

Conditions for safe storage, including any incompatibilities

Storage precautions Store in tightly-closed, original container in a dry, cool and well-ventilated place. Protect from freezing and direct sunlight.

Storage class Corrosive storage.

Specific end uses(s)

Specific end use(s) The identified uses for this product are detailed in Section 1.

8. Exposure controls/Personal protection

Exposure controls

Protective equipment



Appropriate engineering controls As this product contains ingredients with exposure limits, process enclosures, local exhaust ventilation or other engineering controls should be used to keep worker exposure below any statutory or recommended limits, if use generates dust, fumes, gas, vapor or mist.

Eye/face protection Tight-fitting safety glasses.

CHROMIUM HARD,TRIVALENT

Hand protection	It is recommended that chemical-resistant, impervious gloves are worn. Considering the data specified by the glove manufacturer, check during use that the gloves are retaining their protective properties and change them as soon as any deterioration is detected. It is recommended that gloves are made of the following material: Nitrile rubber.
Other skin and body protection	Appropriate footwear and additional protective clothing complying with an approved standard should be worn if a risk assessment indicates skin contamination is possible.
Hygiene measures	Do not eat, drink or smoke when using this product. Wash at the end of each work shift and before eating, smoking and using the toilet.
Respiratory protection	If ventilation is inadequate, suitable respiratory protection must be worn. Respiratory protection must be used if the airborne contamination exceeds the recommended occupational exposure limit.

9. Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Liquid.
Color	Dark. Blue.
Odor	Acidic.
pH	pH (concentrated solution): 6.0-7.0
Initial boiling point and range	100°C/212°F @
Relative density	1.150-1.180
Other information	Not available.

10. Stability and reactivity

Reactivity	There are no known reactivity hazards associated with this product.
Stability	Stable at normal ambient temperatures and when used as recommended.
Possibility of hazardous reactions	Under normal conditions of storage and use, no hazardous reactions will occur.
Conditions to avoid	Avoid excessive heat for prolonged periods of time.
Materials to avoid	None known.
Hazardous decomposition products	None at ambient temperatures.

11. Toxicological information

Information on toxicological effects

Acute toxicity - oral

ATE oral (mg/kg)	4,284.49

Acute toxicity - dermal

ATE dermal (mg/kg)	19,400.35

Acute toxicity - inhalation

ATE inhalation (vapours mg/l)	194.0

CHROMIUM HARD,TRIVALENT

Inhalation	Vapors irritate the respiratory system.
Ingestion	Causes severe burns. May cause chemical burns in mouth, esophagus and stomach.
Skin Contact	May cause serious chemical burns to the skin.
Eye contact	Causes serious eye damage. Immediate first aid is imperative.
Acute and chronic health hazards	May cause burns in mucous membranes, throat, esophagus and stomach.
Route of exposure	Ingestion Inhalation Skin and/or eye contact

Toxicological information on ingredients.

AMMONIUM FORMATE

Acute toxicity - oral	
Acute toxicity oral (LD_{50} mg/kg)	2,250.0
Species	Mouse
ATE oral (mg/kg)	2,250.0

CHROMIUM (III) SULPHATE

Acute toxicity - oral	
ATE oral (mg/kg)	500.0
Acute toxicity - dermal	
ATE dermal (mg/kg)	1,100.0
Acute toxicity - inhalation	
ATE inhalation (vapours mg/l)	11.0

Potassium Sulfate

Acute toxicity - oral	
Acute toxicity oral (LD_{50} mg/kg)	6,600.0
Species	Rat
ATE oral (mg/kg)	6,600.0

AMMONIA ...%

Acute toxicity - oral	
Acute toxicity oral (LD_{50} mg/kg)	350.0
Species	Rat

SODIUM BROMIDE

Acute toxicity - oral

Acute toxicity oral (LD_{50} mg/kg)	3,500.0
Species	Rat
ATE oral (mg/kg)	3,500.0

Acute toxicity - dermal

Acute toxicity dermal (LD_{50} mg/kg)	2,000.0
Species	Rabbit
ATE dermal (mg/kg)	2,000.0

12. Ecological information

Ecotoxicity The product contains a substance which may have hazardous effects on the environment.

Toxicity No data available.

Ecological information on ingredients.

Potassium Sulfate

Acute aquatic toxicity

Acute toxicity - fish LC_{50}, 96 hour: 680 mg/l, Pimephales promelas (Fat-head Minnow)

AMMONIA ...%

Acute aquatic toxicity

$LE(C)_{50}$	0.1 < L(E)C50 ≤ 1
M factor (Acute)	1
Acute toxicity - fish	LC_{50}, 96 hours: 0.53 mg/l, Freshwater fish LC_{50}, 96 hours: 0.75 -3.4 mg/l, Freshwater fish LC_{50}, 96 hours: 8.2 mg/l, Freshwater fish
Acute toxicity - aquatic invertebrates	EC_{50}, 48 hours: 0.66 mg/l, Daphnia magna

SODIUM BROMIDE

Acute aquatic toxicity

Acute toxicity - fish	NOEC, 96 hour: 7800 mg/l, Oryzias latipes (Red killifish) LC_{50}, 96 hour: 160,000 mg/l, Poecilia reticulata (Guppy)
Acute toxicity - aquatic invertebrates	NOEC, 48 hour: 7800 mg/l, Daphnia magna EC_{50}, 48 hours: 5800 mg/l, Daphnia magna

Persistence and degradability

Persistence and degradability No data available.

Bioaccumulative potential

Bio-Accumulative Potential The product does not contain any substances expected to be bioaccumulating.

Mobility in soil

Mobility The product is soluble in water.

CHROMIUM HARD,TRIVALENT

Other adverse effects

Other adverse effects Not determined.

13. Disposal considerations

Waste treatment methods

General information Disposal of this product, process solutions, residues and by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any local authority requirements.

Disposal methods Dispose of waste to licensed waste disposal site in accordance with the requirements of the local Waste Disposal Authority.

14. Transport information

General The product is not covered by international regulations on the transport of dangerous goods (IMDG, IATA, DOT).

UN Number

UN No. (International) Not applicable.

UN proper shipping name

Proper shipping name (International) Not applicable.

Proper shipping name (DOT) NOT RESTRICTED LIQUID

Transport hazard class(es)

Transport Labels (International) No transport warning sign required.

Packing group

Packing group (International) Not applicable.

Environmental hazards

Environmentally Hazardous Substance
No.

Special precautions for user

Not applicable.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

15. Regulatory information

National regulations The customer is advised to check if there are specific local or national regulations specifically applicable to the chemicals contained in the product. The hazards statement for this product is in accordance with international regulations, always observing the most stringent requirements.

US Federal Regulations

SARA Section 302 Extremely Hazardous Substances Tier II Threshold Planning Quantities
Exempt.

CHROMIUM HARD,TRIVALENT

CERCLA/Superfund, Hazardous Substances/Reportable Quantities (EPA)

Ammonium Chloride
Final CERCLA RQ: 5,000 lbs
Chromium Sulphate
Final CERCLA RQ: 1,000 lbs

SARA Extremely Hazardous Substances EPCRA Reportable Quantities

Exempt.

SARA 313 Emission Reporting

Chromium Sulphate

CAA Accidental Release Prevention

HAP
Chromium Sulphate

SARA (311/312) Hazard Categories

Acute
Chronic

OSHA Highly Hazardous Chemicals

Exempt.

US State Regulations

California Proposition 65 Carcinogens and Reproductive Toxins

Chromium Sulphate

California Directors List of Hazardous Substances

Ammonium Chloride
Chromium Sulphate

Inventories

US - TSCA

All ingredients are present.

16. Other information

Classification abbreviations and acronyms	Acute Tox. = Acute toxicity Carc. = Carcinogenicity Eye Dam. = Serious eye damage Eye Irrit. = Eye irritation Flam. Liq. = Flammable liquid Muta. = Germ cell mutagenicity Resp. Sens. = Respiratory sensitisation Skin Corr. = Skin corrosion Skin Irrit. = Skin irritation Skin Sens. = Skin sensitisation STOT RE = Specific target organ toxicity-repeated exposure STOT SE = Specific target organ toxicity-single exposure
Revision date	8/10/2018
Revision	3

CHROMIUM HARD,TRIVALENT

Hazard statements in full	H302 Harmful if swallowed. H312 Harmful in contact with skin. H314 Causes severe skin burns and eye damage. H315 Causes skin irritation. H318 Causes serious eye damage. H319 Causes serious eye irritation. H332 Harmful if inhaled. H335 May cause respiratory irritation. H400 Very toxic to aquatic life. H402 Harmful to aquatic life.
NFPA - health hazard	Extremely hazardous, serious injury. (3)
NFPA - flammability hazard	Will not burn. (0)
NFPA - instability hazard	Normally stable. (0)

The Information in this data sheet is believed to be correct but neither we nor our employees or agents give any warranty or make any representation to the accuracy thereof and accept no liability for any loss, injury or damage which may result in it's use. The sole purpose of this data sheet is to provide guidance on the safe handling and use of the products to which it relates. It does not form part of any product specification nor part of any contract. It is not practical for the guidance and information in this data sheet to cover every conceivable application of a product and as we may not be aware of the use to which the products covered by this data sheet are to be put it remains the responsibility of the user to conduct it's own tests and to satisy itself as to the suitability of the product.

SAFETY DATA SHEET

Version 4.6
Revision Date 04/24/2015
Print Date 02/08/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Vanadium

Product Number : 262935
Brand : Aldrich

CAS-No. : 7440-62-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Not a hazardous substance or mixture.

2.2 GHS Label elements, including precautionary statements

Not a hazardous substance or mixture.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : V
Molecular weight : 50.94 g/mol
CAS-No. : 7440-62-2
EC-No. : 231-171-1

Hazardous components

Component	Classification	Concentration
Vanadium		
		<= 100 %

4. FIRST AID MEASURES

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Vanadium/vanadium oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions
No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Handle and store under inert gas. Keep in a dry place.
Storage class (TRGS 510): Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Vanadium	7440-62-2	TWA	1.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3.000000 mg/m3	USA. NIOSH Recommended Exposure Limits

8.2 Exposure controls

Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
No special environmental precautions required.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: grey
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing	Melting point/range: 1,890 °C (3,434 °F) - lit.

	point	
f)	Initial boiling point and boiling range	3,380 °C (6,116 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	10.67 hPa (8.00 mmHg) at 20 °C (68 °F)
l)	Vapour density	No data available
m)	Relative density	6.11 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong acids, Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

Carcinogenicity - Rat - Intramuscular
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Tumorigenic:Tumors at site or application.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: YW1355000

metallic taste, greenish-black discoloration of the tongue, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Vanadium	7440-62-2	2007-03-01

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Vanadium	7440-62-2	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Vanadium	7440-62-2	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Vanadium	7440-62-2	2007-03-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.6 Revision Date: 04/24/2015 Print Date: 02/08/2016

SAFETY DATA SHEET

Version 3.11
Revision Date 12/01/2015
Print Date 02/18/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Vinyl chloride

Product Number : 387622
Brand : Aldrich
Index-No. : 602-023-00-7

CAS-No. : 75-01-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable gases (Category 1), H220
Gases under pressure (Liquefied gas), H280
Carcinogenicity (Category 1A), H350

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H220 Extremely flammable gas.
H280 Contains gas under pressure; may explode if heated.
H350 May cause cancer.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P281 Use personal protective equipment as required.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.

P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381	Eliminate all ignition sources if safe to do so.
P405	Store locked up.
P410 + P403	Protect from sunlight. Store in a well-ventilated place.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

May form explosive peroxides.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Chloroethylene
Formula	:	C_2H_3Cl
Molecular weight	:	62.50 g/mol
CAS-No.	:	75-01-4
EC-No.	:	200-831-0
Index-No.	:	602-023-00-7

Hazardous components

Component	Classification	Concentration
Vinyl chloride		
	Flam. Gas 1; Press. Gas Liquefied gas; Carc. 1A; SA ; H220, H280, H350,	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Clean up promptly by sweeping or vacuum.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Contents under pressure. Light sensitive.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Vinyl chloride	75-01-4	TWA	1 ppm	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	1 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Liver damage Lung cancer Confirmed human carcinogen		
		STEL	5 ppm	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	1 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		STEL	5 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		See 1910.1017		
		Potential Occupational Carcinogen See Appendix A		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 120 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Liquefied gas
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -153.8 °C (-244.8 °F) - lit.
f)	Initial boiling point and boiling range	-13.4 °C (7.9 °F) - lit.
g)	Flash point	-61.0 °C (-77.8 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or	Upper explosion limit: 33 %(V) Lower explosion limit: 3.6 %(V)

	explosive limits	
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	0.911 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.
Contains the following stabiliser(s):
Hydroquinone (>=0 - <=0.0001 %)
Phenol (>=0 - <=0.01 %)

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

10.5 Incompatible materials
Chemically active metals, Copper

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

LC50 Inhalation - Rat - 0.3 h - 180000 ppm
Remarks: Behavioral:Tremor. Behavioral:Convulsions or effect on seizure threshold. Respiratory disorder

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This is or contains a component that has been reported to be carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Human carcinogen.

IARC:	1 - Group 1: Carcinogenic to humans (Vinyl chloride)
NTP:	Known to be human carcinogen (Vinyl chloride)
OSHA:	OSHA specifically regulated carcinogen (Vinyl chloride)

Reproductive toxicity
No data available

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: KU9625000

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Central nervous system -
Stomach - Irregularities - Based on Human Evidence (Phenol)
Liver - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1086 Class: 2.1
Proper shipping name: Vinyl chloride, stabilized
Reportable Quantity (RQ): 1 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1086 Class: 2.1 EMS-No: F-D, S-U
Proper shipping name: VINYL CHLORIDE, STABILIZED

IATA
UN number: 1086 Class: 2.1
Proper shipping name: Vinyl chloride, stabilized
IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

SARA 302 Components
The following components are subject to reporting levels established by SARA Title III, Section 302:

	CAS-No.	Revision Date
Phenol	108-95-2	2007-07-01
Hydroquinone	123-31-9	2007-07-01

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01
Phenol	108-95-2	2007-07-01
Hydroquinone	123-31-9	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01
Phenol	108-95-2	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

	May displace oxygen and cause rapid suffocation.
Carc.	Carcinogenicity
Flam. Gas	Flammable gases
H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.
H350	May cause cancer.
Press. Gas	Gases under pressure
SA	Simple Asphyxiant

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	4
Physical Hazard	3

NFPA Rating

Health hazard:	2
Fire Hazard:	4
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.11 Revision Date: 12/01/2015 Print Date: 02/18/2016

SAFETY DATA SHEET

Creation Date 22-Sep-2009 **Revision Date** 25-Apr-2019 **Revision Number** 6

1. Identification

Product Name **Vinylidene chloride, stabilized**

Cat No. : **AC172290000; AC172290010; AC172290025; AC172290250**

CAS-No 75-35-4
Synonyms 1,1-Dichloroethylene

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 1
Acute oral toxicity	Category 4
Acute Inhalation Toxicity - Vapors	Category 4
Serious Eye Damage/Eye Irritation	Category 2
Carcinogenicity	Category 2
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Nasal Cavities, Liver.	

Label Elements

Signal Word
Danger

Hazard Statements
Extremely flammable liquid and vapor
Causes serious eye irritation

Suspected of causing cancer
May cause damage to organs through prolonged or repeated exposure
Harmful if swallowed or if inhaled



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Wear eye/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep cool
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Toxic to aquatic life with long lasting effects
WARNING. Cancer - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Vinylidene chloride	75-35-4	>95
4-Methoxyphenol	150-76-5	0.02

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Get medical attention.

Inhalation Remove to fresh air. If breathing is difficult, give oxygen. Get medical attention.

Ingestion Do NOT induce vomiting. Get medical attention.

Most important symptoms and effects Difficulty in breathing. . Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. Water mist may be used to cool closed containers. Chemical foam. Water mist may be used to cool closed containers.

Unsuitable Extinguishing Media No information available

Flash Point -25 °C / -13 °F

Method - No information available

Autoignition Temperature 520 °C / 968 °F

Explosion Limits

Upper	16.5%
Lower	8.4%
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Extremely flammable. Vapors may travel to source of ignition and flash back. Vapors may form explosive mixture with air. Containers may explode when heated. Vapors may form explosive mixtures with air.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2). Formaldehyde. peroxides. Hydrogen chloride gas.

Protective Equipment and Precautions for Firefighters
Vapors are heavier than air and may spread along floors. As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	4	1	N/A

6. Accidental release measures

Personal Precautions Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions Do not flush into surface water or sanitary sewer system. See Section 12 for additional Ecological Information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment. Do not let this chemical enter the environment.

7. Handling and storage

Handling

Ensure adequate ventilation. Wear personal protective equipment/face protection. Avoid contact with skin and eyes. Take precautionary measures against static discharges. Do not ingest. If swallowed then seek immediate medical assistance. Handle product only in closed system or provide appropriate exhaust ventilation. Use spark-proof tools and explosion-proof equipment. Use only non-sparking tools. Do not subject to grinding/shock/friction. Avoid breathing dust/fume/gas/mist/vapors/spray. Keep away from open flames, hot surfaces and sources of ignition. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded.

Storage

Refrigerator/flammables. Keep away from heat, sparks and flame. Protect from light. May form explosive peroxides on prolonged storage. Keep under nitrogen. Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Vinylidene chloride	TWA: 5 ppm	(Vacated) TWA: 1 ppm (Vacated) TWA: 4 mg/m³		TWA: 5 ppm
4-Methoxyphenol	TWA: 5 mg/m³	(Vacated) TWA: 5 mg/m³	TWA: 5 mg/m³	TWA: 5 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures

Use explosion-proof electrical/ventilating/lighting/equipment. Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection

Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	aromatic
Odor Threshold	No information available
pH	7 2.5 g/l aq.sol
Melting Point/Range	-122 °C / -187.6 °F
Boiling Point/Range	31.2 - 32 °C / 88.2 - 89.6 °F @ 760 mmHg
Flash Point	-25 °C / -13 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	

Upper	16.5%
Lower	8.4%
Vapor Pressure	665 mbar @ 20 °C
Vapor Density	3.4 (Air = 1.0)
Specific Gravity	1.218
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	520 °C / 968 °F
Decomposition Temperature	No information available
Viscosity	.377 mPa.s at 15 °C
Molecular Formula	C2 H2 Cl2
Molecular Weight	96.94

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability May form explosive peroxides. Hazardous polymerization may occur upon depletion of inhibitor. Moisture sensitive. Air sensitive. Light sensitive.

Conditions to Avoid Keep away from open flames, hot surfaces and sources of ignition. Excess heat. Exposure to air. Exposure to light. Incompatible products. Exposure to moist air or water.

Incompatible Materials Strong oxidizing agents, Strong bases, Finely powdered metals, oxygen, Peroxides, Metals, copper, Finely powdered metals, Acids

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2), Formaldehyde, peroxides, Hydrogen chloride gas

Hazardous Polymerization Hazardous polymerization may occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Oral LD50 Category 4. ATE = 300 - 2000 mg/kg.

Vapor LC50 Category 4. ATE = 10 - 20 mg/l.

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Vinylidene chloride	LD50 = 1500 mg/kg (Rat) LD50 = 200 mg/kg (Rat)	Not listed	LC50 = 1.66 mg/L (Rat) 4 h LC50 = 6350 ppm (Rat) 4 h
4-Methoxyphenol	1600 mg/kg (Rat)	LD50 > 2000 mg/kg (Rabbit)	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation May cause skin, eye, and respiratory tract irritation

Sensitization No information available

Carcinogenicity Limited evidence of a carcinogenic effect. The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Vinylidene chloride	75-35-4	Group 2B	Not listed	Not listed	X	Not listed
4-Methoxyphenol	150-76-5	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects Ames test: positive.

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure Nasal Cavities Liver

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

The product contains following substances which are hazardous for the environment. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Vinylidene chloride	Not listed	LC50: 161 - 179 mg/L, 96h static (Pimephales promelas) LC50: 57 - 91 mg/L, 96h static (Lepomis macrochirus) LC50: 85 - 117 mg/L, 96h flow-through (Pimephales promelas)	EC50 > 2000 mg/L 17 h	LC50: 62 - 110 mg/L, 48h Static (Daphnia magna) LC50: 9.0 - 14.0 mg/L, 48h Static (Daphnia magna)
4-Methoxyphenol	Not listed	LC50: = 28.5 mg/L, 96h flow-through (Oncorhynchus mykiss) LC50: = 84.3 mg/L, 96h flow-through (Pimephales promelas)	EC50 = 3.66 mg/L 5 min EC50 = 4.30 mg/L 15 min EC50 = 4.61 mg/L 30 min	Not listed

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility.

Component	log Pow
Vinylidene chloride	2.02
4-Methoxyphenol	1.3

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Vinylidene chloride - 75-35-4	U078	-

14. Transport information

DOT

UN-No	UN1303
Proper Shipping Name	VINYLIDENE CHLORIDE, STABILIZED
Hazard Class	3
Packing Group	I

TDG

UN-No	UN1303
Proper Shipping Name	VINYLIDENE CHLORIDE, STABILIZED
Hazard Class	3
Packing Group	I

IATA

UN-No	UN1303
Proper Shipping Name	VINYLIDENE CHLORIDE, STABILIZED
Hazard Class	3
Packing Group	I

IMDG/IMO

UN-No	UN1303
Proper Shipping Name	VINYLIDENE CHLORIDE, STABILIZED
Hazard Class	3
Subsidiary Hazard Class	P
Packing Group	I

15. Regulatory information

United States of America Inventory

Component	CAS-No	TSCA	TSCA Inventory notification - Active/Inactive	TSCA - EPA Regulatory Flags
Vinylidene chloride	75-35-4	X	ACTIVE	-
4-Methoxyphenol	150-76-5	X	ACTIVE	-

Legend:
TSCA - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Australia (AICS), China (IECSC), Korea (ECL).

Component	CAS-No	DSL	NDSL	EINECS	PICCS	ENCS	AICS	IECSC	KECL
Vinylidene chloride	75-35-4	X	-	200-864-0	X	X	X	X	KE-10122
4-Methoxyphenol	150-76-5	X	-	205-769-8	X	X	X	X	KE-23353

U.S. Federal Regulations

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Vinylidene chloride	75-35-4	>95	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Vinylidene chloride	X	100 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Vinylidene chloride	X		-

OSHA - Occupational Safety and Health Administration: Not applicable

CERCLA: This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Vinylidene chloride	100 lb 1 lb	-

California Proposition 65: This product contains the following Proposition 65 chemicals.

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Vinylidene chloride	75-35-4	Carcinogen	0.88 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Vinylidene chloride	X	X	X	X	X
4-Methoxyphenol	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security: This product contains the following DHS chemicals:
Legend - STQs = Screening Threshold Quantities, APA = A placarded amount

Component	DHS Chemical Facility Anti-Terrorism Standard
Vinylidene chloride	Release STQs - 10000lb

Other International Regulations

Mexico - Grade: No information available

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 22-Sep-2009
Revision Date 25-Apr-2019
Print Date 25-Apr-2019
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

Safety Data Sheet
acc. to OSHA HCS

Printing date 03/28/2019 Version Number 4 Reviewed on 03/23/2019

*
1 Identification

· **Product identifier**

· **Trade name: VOC Gas Standard (1X1 mL)**

· **Part number:** DWM-544-1
· **Application of the substance / the mixture** Reagents and Standards for Analytical Chemical Laboratory Use

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
Agilent Technologies, Inc.
5301 Stevens Creek Blvd.
Santa Clara, CA 95051 USA

· **Information department:**
Telephone: 800-227-9770
e-mail: pdl-msds_author@agilent.com
· **Emergency telephone number:** CHEMTREC®: 1-800-424-9300

*
2 Hazard(s) identification

· **Classification of the substance or mixture**


GHS02 Flame

Flam. Liq. 2 H225 Highly flammable liquid and vapor.


GHS06 Skull and crossbones

Acute Tox. 3 H331 Toxic if inhaled.


GHS08 Health hazard

Carc. 1A H350 May cause cancer.
STOT SE 1 H370 Causes damage to organs.

· **Label elements**
· **GHS label elements** The product is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms**


GHS02 GHS06 GHS08

· **Signal word** Danger

· **Hazard-determining components of labeling:**
methanol
vinyl chloride
bromomethane
· **Hazard statements**
Highly flammable liquid and vapor.

(Contd. on page 2)

Safety Data Sheet
acc. to OSHA HCS

Trade name: VOC Gas Standard (1X1 mL)

(Contd. of page 1)

Toxic if inhaled.
May cause cancer.
Causes damage to organs.

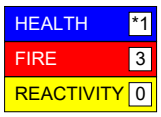
· **Precautionary statements**
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilating/lighting/equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Do not breathe dust/fume/gas/mist/vapors/spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
IF exposed or concerned: Get medical advice/attention.
Specific treatment (see on this label).
In case of fire: Use for extinction: CO2, powder or water spray.
Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.
Dispose of contents/container in accordance with local/regional/national/international regulations.

· **Classification system:**
· **NFPA ratings (scale 0 - 4)**



Health = 1
Fire = 3
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**



Health = *1
Fire = 3
Reactivity = 0

· **Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

*
3 Composition/information on ingredients

· **Chemical characterization: Mixtures**
· **Description:** Mixture of the substances listed below with nonhazardous additions.

· **Dangerous components:**		
67-56-1	methanol	98.483%
74-87-3	chloromethane	0.253%
75-01-4	vinyl chloride	0.253%

(Contd. on page 3)

(Contd. of page 2)

75-00-3	chloroethane	0.253%

4 First-aid measures

· **Description of first aid measures**
· **General information:**
Immediately remove any clothing soiled by the product.
Remove breathing apparatus only after contaminated clothing have been completely removed.
In case of irregular breathing or respiratory arrest provide artificial respiration.
· **After inhalation:**
Supply fresh air or oxygen; call for doctor.
In case of unconsciousness place patient stably in side position for transportation.
· **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
· **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
· **After swallowing:** If symptoms persist consult doctor.
· **Information for doctor:**
· **Most important symptoms and effects, both acute and delayed** No further relevant information available.
· **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:**
CO2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
· **For safety reasons unsuitable extinguishing agents:** Water with full jet
· **Special hazards arising from the substance or mixture**
During heating or in case of fire poisonous gases are produced.
· **Advice for firefighters**
· **Protective equipment:** Mouth respiratory protective device.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures**
Mount respiratory protective device.
Wear protective equipment. Keep unprotected persons away.
· **Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
· **Methods and material for containment and cleaning up:**
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
· **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
· **Protective Action Criteria for Chemicals**

· **PAC-1:**		
67-56-1	methanol	530 ppm

(Contd. on page 4)

(Contd. of page 3)

74-87-3	chloromethane	150 ppm
74-83-9	bromomethane	19 ppm
75-01-4	vinyl chloride	250 ppm
75-71-8	dichlorodifluoromethane	3,000 ppm
75-69-4	trichlorofluoromethane	91 ppm
75-00-3	chloroethane	300 ppm

· **PAC-2:**

67-56-1	methanol	2,100 ppm
74-87-3	chloromethane	910 ppm
74-83-9	bromomethane	210 ppm
75-01-4	vinyl chloride	1,200 ppm
75-71-8	dichlorodifluoromethane	10,000 ppm
75-69-4	trichlorofluoromethane	1,000 ppm
75-00-3	chloroethane	5100* ppm

· **PAC-3:**

67-56-1	methanol	7200* ppm
74-87-3	chloromethane	3,000 ppm
74-83-9	bromomethane	740 ppm
75-01-4	vinyl chloride	4800* ppm
75-71-8	dichlorodifluoromethane	50,000 ppm
75-69-4	trichlorofluoromethane	10,000 ppm
75-00-3	chloroethane	20000** ppm

7 Handling and storage

· **Handling:**
· **Precautions for safe handling**
Ensure good ventilation/exhaustion at the workplace.
Open and handle receptacle with care.
Prevent formation of aerosols.
· **Information about protection against explosions and fires:**
Keep ignition sources away - Do not smoke.
Protect against electrostatic charges.
Keep respiratory protective device available.

· **Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** Store in a cool location.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:**
Keep receptacle tightly sealed.
Store in cool, dry conditions in well sealed receptacles.
· **Specific end use(s)** No further relevant information available.

(Contd. on page 5)

(Contd. of page 4)

8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see item 7.

· **Control parameters**

· **Components with limit values that require monitoring at the workplace:**	
67-56-1 methanol	
PEL	Long-term value: 260 mg/m³, 200 ppm
REL	Short-term value: 325 mg/m³, 250 ppm Long-term value: 260 mg/m³, 200 ppm Skin
TLV	Short-term value: 328 mg/m³, 250 ppm Long-term value: 262 mg/m³, 200 ppm Skin; BEI
74-87-3 chloromethane	
PEL	Long-term value: 100 ppm Ceiling limit value: 200; 300* ppm *5-min peak in any 3 hrs
REL	See Pocket Guide App. A
TLV	Short-term value: 207 mg/m³, 100 ppm Long-term value: 103 mg/m³, 50 ppm Skin
75-01-4 vinyl chloride	
PEL	Short-term value: 5* ppm Long-term value: 1 ppm *Avg. not exceeding any 15 min; see 29CFR1910.1017
REL	See Pocket Guide App.A
TLV	Long-term value: 2.6 mg/m³, 1 ppm
75-00-3 chloroethane	
PEL	Long-term value: 2600 mg/m³, 1000 ppm
REL	Handle with caution; See Pocket Guide App. C
TLV	Long-term value: 264 mg/m³, 100 ppm Skin

· **Ingredients with biological limit values:**	
67-56-1 methanol	
BEI	15 mg/L Medium: urine Time: end of shift Parameter: Methanol (background, nonspecific)

· **Additional information:** The lists that were valid during the creation were used as basis.

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.

(Contd. on page 6)

(Contd. of page 5)

Store protective clothing separately.

· **Breathing equipment:**
When used as intended with Agilent instruments, the use of the product under normal laboratory conditions and with standard practices does not result in significant airborne exposures and therefore respiratory protection is not needed.
Under an emergency condition where a respirator is deemed necessary, use a NIOSH or equivalent approved device/equipment with appropriate organic or acid gas cartridge.

· **Protection of hands:**
Although not recommended for constant contact with the chemicals or for clean-up, nitrile gloves 11-13 mil thickness are recommended for normal use. The breakthrough time is 1 hr. For cleaning a spill where there is direct contact of the chemical, butyl rubber gloves are recommended 12-15 mil thickness with breakthrough times exceeding 4 hrs. Supplier recommendations should be followed.

· **Material of gloves**
For normal use: nitrile rubber, 11-13 mil thickness
For direct contact with the chemical: butyl rubber, 12-15 mil thickness

· **Penetration time of glove material**
For normal use: nitrile rubber: 1 hour
For direct contact with the chemical: butyl rubber: >4 hours

· **Eye protection:**



Tightly sealed goggles

9 Physical and chemical properties

· **Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Fluid
Color:	Colorless
· **Odor:**	Alcohol-like
· **Odor threshold:**	Not determined.
· **pH-value:**	Not determined.
· **Change in condition**	
Melting point/Melting range:	-98 °C (-144.4 °F)
Boiling point/Boiling range:	64.7 °C (148.5 °F)
· **Flash point:**	9 °C (48.2 °F)
· **Flammability (solid, gaseous):**	Not applicable.
· **Ignition temperature:**	455 °C (851 °F)
· **Decomposition temperature:**	Not determined.
· **Auto igniting:**	Product is not selfigniting.
· **Danger of explosion:**	Product is not explosive. However, formation of explosive air/vapor mixtures are possible.

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(Contd. of page 6)

· **Explosion limits:**	
Lower:	5.5 Vol %
Upper:	44 Vol %
· **Vapor pressure at 20 °C (68 °F):**	100 hPa (75 mm Hg)
· **Density at 20 °C (68 °F):**	0.80692 g/cm³ (6.73375 lbs/gal)
· **Relative density**	Not determined.
· **Vapor density**	Not determined.
· **Evaporation rate**	Not determined.
· **Solubility in / Miscibility with**	
Water:	Not miscible or difficult to mix.
· **Partition coefficient (n-octanol/water):**	Not determined.
· **Viscosity:**	
Dynamic:	Not determined.
Kinematic:	Not determined.
· **Solvent content:**	
Organic solvents:	98.7 %
VOC content:	98.48 % 794.7 g/l / 6.63 lb/gal
Solids content:	0.0 %
· **Other information**	No further relevant information available.

10 Stability and reactivity

· **Reactivity** No further relevant information available.
· **Chemical stability**
· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
· **Possibility of hazardous reactions** No dangerous reactions known.
· **Conditions to avoid** No further relevant information available.
· **Incompatible materials:** No further relevant information available.
· **Hazardous decomposition products:** No dangerous decomposition products known.

*

11 Toxicological information

· **Information on toxicological effects**
· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**		
ATE (Acute Toxicity Estimate)		
Oral	LD50	84,652 mg/kg (rat)
Inhalative	LC50/4 h	3.05 mg/L

67-56-1 methanol		
Oral	LD50	5,628 mg/kg (rat)
Dermal	LD50	15,800 mg/kg (rabbit)

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74-87-3 chloromethane		
Oral	LD50	1,800 mg/kg (rat)
Inhalative	LC50/4 h	>21,800 mg/L (rat)
74-83-9 bromomethane		
Oral	LD50	214 mg/kg (rat)
Inhalative	LC50/4 h	302 mg/L (rat)
75-01-4 vinyl chloride		
Oral	LD50	500 mg/kg (rat)
75-69-4 trichlorofluoromethane		
Oral	LD50	>15,000 mg/kg (rat)
75-00-3 chloroethane		
Inhalative	LC50/4 h	>19,000 mg/L (rat)

· **Primary irritant effect:**
· **on the skin:** No irritant effect.
· **on the eye:** No irritating effect.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**
The product shows the following dangers according to internally approved calculation methods for preparations:
Toxic

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**		
74-87-3	chloromethane	3
74-83-9	bromomethane	3
75-01-4	vinyl chloride	1
75-00-3	chloroethane	3

· **NTP (National Toxicology Program)**		
75-01-4	vinyl chloride	K

· **OSHA-Ca (Occupational Safety & Health Administration)**	
75-01-4	vinyl chloride

12 Ecological information

· **Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **Persistence and degradability** No further relevant information available.
· **Behavior in environmental systems:**
· **Bioaccumulative potential** No further relevant information available.
· **Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Water hazard class 2 (Self-assessment): hazardous for water
Do not allow product to reach ground water, water course or sewage system.
Danger to drinking water if even small quantities leak into the ground.
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.

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· **vPvB:** Not applicable.
· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

· **Uncleaned packagings:**
· **Recommendation:** Disposal must be made according to official regulations.

*
14 Transport information

· **Not Regulated, De minimus Quantities**	-
· **UN-Number**	
· **DOT, IMDG, IATA**	UN1230
· **UN proper shipping name**	
· **DOT**	Methanol
· **IMDG, IATA**	METHANOL
· **Transport hazard class(es)**	
· **DOT**	
· **Class**	3 Flammable liquids
· **Label**	3, 6.1
· **IMDG**	
· **Class**	3 Flammable liquids
· **Label**	3/6.1
· **IATA**	
· **Class**	3 Flammable liquids
· **Label**	3 (6.1)
· **Packing group**	
· **DOT, IMDG, IATA**	II

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· **Environmental hazards:**	Not applicable.
· **Special precautions for user**	Warning: Flammable liquids
· **Danger code (Kemler):**	336
· **EMS Number:**	F-E,S-D
· **Stowage Category**	B
· **Stowage Code**	SW2 Clear of living quarters.
· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **Transport/Additional information:**	
· **DOT**	
· **Quantity limitations**	On passenger aircraft/rail: 1 L On cargo aircraft only: 60 L
· **IMDG**	
· **Limited quantities (LQ)**	1L
· **Excepted quantities (EQ)**	Code: E2 Maximum net quantity per inner packaging: 30 ml Maximum net quantity per outer packaging: 500 ml
· **UN "Model Regulation":**	UN 1230 METHANOL, 3 (6.1), II

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15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **Sara**

· **Section 355 (extremely hazardous substances):**	
74-83-9	bromomethane

· **Section 313 (Specific toxic chemical listings):**
All ingredients are listed.

· **TSCA (Toxic Substances Control Act):**
All ingredients are listed.

· **Proposition 65**

· **Chemicals known to cause cancer:**	
75-01-4	vinyl chloride
75-00-3	chloroethane

· **Chemicals known to cause reproductive toxicity for females:**
None of the ingredients is listed.

· **Chemicals known to cause reproductive toxicity for males:**	
74-87-3	chloromethane

· **Chemicals known to cause developmental toxicity:**	
67-56-1	methanol
74-87-3	chloromethane
74-83-9	bromomethane

(Contd. on page 11)

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· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**		
74-87-3	chloromethane	D, CBD
74-83-9	bromomethane	D
75-01-4	vinyl chloride	A, K/L

· **TLV (Threshold Limit Value established by ACGIH)**		
74-87-3	chloromethane	A4
74-83-9	bromomethane	A4
75-01-4	vinyl chloride	A1
75-71-8	dichlorodifluoromethane	A4
75-69-4	trichlorofluoromethane	A4
75-00-3	chloroethane	A3

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**	
74-87-3	chloromethane
74-83-9	bromomethane
75-01-4	vinyl chloride

· **National regulations:**
· **Additional classification according to Decree on Hazardous Materials:**
Carcinogenic hazardous material group III (dangerous).

· **Information about limitation of use:**
Workers are not allowed to be exposed to the hazardous carcinogenic materials contained in this preparation.
Exceptions can be made by the authorities in certain cases.
· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

The information contained in this document is based on Agilent's state of knowledge at the time of preparation.
No warranty as to its accurateness, completeness or suitability for a particular purpose is expressed or implied.

· **Department issuing SDS:** Document Control / Regulatory
· **Contact:** regulatory@ultrasci.com
· **Date of preparation / last revision** 03/28/2019 / 3
· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
VOC: Volatile Organic Compounds (USA, EU)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety

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Trade name: VOC Gas Standard (1X1 mL)

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OSHA: Occupational Safety & Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
BEI: Biological Exposure Limit
Flam. Liq. 2: Flammable liquids – Category 2
Acute Tox. 3: Acute toxicity – Category 3
Carc. 1A: Carcinogenicity – Category 1A
STOT SE 1: Specific target organ toxicity (single exposure) – Category 1

· *** Data compared to the previous version altered.**

SAFETY DATA SHEET

Version 4.9
Revision Date 08/24/2015
Print Date 02/07/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Zinc

Product Number : 324930
Brand : Aldrich
Index-No. : 030-001-00-1

CAS-No. : 7440-66-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Self-heating substances and mixtures (Category 1), H251
Substances and mixtures, which in contact with water, emit flammable gases (Category 1), H260
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H251 Self-heating: may catch fire.
H260 In contact with water releases flammable gases which may ignite spontaneously.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P223 Do not allow contact with water.
P231 + P232 Handle under inert gas. Protect from moisture.
P235 + P410 Keep cool. Protect from sunlight.
P273 Avoid release to the environment.

P280	Wear protective gloves/ eye protection/ face protection.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P402 + P404	Store in a dry place. Store in a closed container.
P407	Maintain air gap between stacks/ pallets.
P413	Store bulk masses greater than .? kg/ .? lbs at temperatures not exceeding .? °C/ .? °F.
P420	Store away from other materials.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Combustible dust

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Zn
Molecular weight	:	65.39 g/mol
CAS-No.	:	7440-66-6
EC-No.	:	231-175-3
Index-No.	:	030-001-00-1

Hazardous components

Component	Classification	Concentration
Zinc powder (pyrophoric)		
	Self-heat. 1; Water-react. 1; Aquatic Acute 1; Aquatic Chronic 1; H251, H260, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Dry powder

5.2 Special hazards arising from the substance or mixture
Zinc/zinc oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.Keep away from sources of ignition - No smoking.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Keep in a dry place.
Storage class (TRGS 510): Pyrophoric and self-heating hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Protective gloves against thermal risks

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: grey
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 420 °C (788 °F) - lit.
f)	Initial boiling point and boiling range	907 °C (1,665 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	May form combustible dust concentrations in air
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	1 hPa (1 mmHg) at 487 °C (909 °F)

l)	Vapour density	No data available
m)	Relative density	7.133 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 5
p)	Auto-ignition temperature	The substance or mixture is classified as self heating with the category 1.
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Reacts violently with water.

10.4 Conditions to avoid
Exposure to moisture

10.5 Incompatible materials
Strong acids and oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
Did not cause sensitisation on laboratory animals.

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as

probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: ZG8600000

chills, dry throat, sweet taste, Fever, Cough, Nausea, Vomiting, Weakness
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Cyprinus carpio (Carp) - 450.0 µg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 0.068 mg/l - 48 h
	mortality NOEC - Daphnia (water flea) - 0.101 - 0.14 mg/l - 7 d

12.2 Persistence and degradability

12.3 Bioaccumulative potential

Bioaccumulation	Algae - 7 d at 16 °C - 5 µg/l
	Bioconcentration factor (BCF): 466

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1436 Class: 4.3 (4.2) Packing group: II
Proper shipping name: Zinc powder
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1436 Class: 4.3 (4.2) Packing group: II EMS-No: F-G, S-O
Proper shipping name: ZINC POWDER
Marine pollutant:yes

IATA
UN number: 1436 Class: 4.3 (4.2) Packing group: II
Proper shipping name: Zinc powder

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Zinc powder (pyrophoric)	7440-66-6	1993-04-24

SARA 311/312 Hazards
Reactivity Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Zinc powder (pyrophoric)	7440-66-6	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Zinc powder (pyrophoric)	7440-66-6	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Zinc powder (pyrophoric)	7440-66-6	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H251	Self-heating: may catch fire.
H260	In contact with water releases flammable gases which may ignite spontaneously.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
Self-heat.	Self-heating substances and mixtures

HMIS Rating
Health hazard: 0

Chronic Health Hazard:	
Flammability:	3
Physical Hazard	1

NFPA Rating

Health hazard:	0
Fire Hazard:	3
Reactivity Hazard:	1
Special hazard.I:	W

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.9 Revision Date: 08/24/2015 Print Date: 02/07/2016

ATTACHMENT F

JOBSITE SAFETY INSPECTION CHECKLIST

Jobsite Safety Inspection Checklist

Date: _____ **Inspected By:** _____

Location: _____ **Project #:** _____

Check one of the following: **A:** Acceptable **NA**: Not Applicable **D**: Deficiency

	A	NA	D	Remark
1. HASP available onsite for inspection?				
2. Health & Safety Compliance agreement (in HASP) appropriately signed by Langan employees and contractors?				
3. Hospital route map with directions posted on site?				
4. Emergency Notification List posted on site?				
5. First Aid kit available and properly stocked?				
6. Personnel trained in CPR/First Aid on site?				
7. MSDSs readily available, and all workers knowledgeable about the specific chemicals and compounds to which they may be exposed?				
8 Appropriate PPE being worn by Langan employees and contractors?				
9. Project site safe practices ("Standing Orders") posted?				
10. Project staff have 40-hr./8-hr./Supervisor HAZWOPER training?				
11. Project staff medically cleared to work in hazardous waste sites and fit-tested to wear respirators, if needed?				
12. Respiratory protection readily available?				
13. Health & Safety Incident Report forms available?				
14. Air monitoring instruments calibrated daily, and results recorded on the Daily Instrument Calibration check sheet?				
15. Air monitoring readings recorded on the air monitoring data sheet/field logbook?				
16. Subcontract workers have received 40-hr./8-hr./Spvsr. HAZWOPER training, as appropriate?				
17. Subcontract workers medically cleared to work on site, and fit-tested for respirator wear?				
18. Subcontract workers have respirators readily available?				
19. Mark outs of underground utilities done prior to initiating any subsurface activities?				
20. Decontamination procedures being followed as outlined in HASP?				
21. Are tools in good condition and properly used?				
22. Drilling performed in areas free from underground objects including utilities?				

23. Adequate size/type fire extinguisher supplied?				
24. Equipment at least 20 feet from overhead powerlines?				
25. Evidence that drilling operator is responsible for the safety of his rig.				
26. Trench sides shored, layer back, or boxed?				
27. Underground utilities located, and authorities contacted before digging?				
28. Ladders in trench (25-foot spacing)?				
29. Excavated material placed more than 2 feet away from excavation edge?				
30. Public protected from exposure to open excavation?				
31. People entering the excavation regarding it as a permit-required confined space and following appropriate procedures?				
32. Confined space entry permit is completed and posted?				
33. All persons knowledgeable about the conditions and characteristics of the confined space?				
34. All persons engaged in confined space operations have been trained in safe entry and rescue (non-entry)?				
35. Full body harnesses, lifelines, and hoisting apparatus available for rescue needs?				
36. Attendant and/or supervisor certified in basic first aid and CPR?				
37. Confined space atmosphere checked before entry and continuously while the work is going on?				
38. Results of confined space atmosphere testing recorded?				
39. Evidence of coordination with off-site rescue services to perform entry rescue, if needed?				
40. Are extension cords rated for this work being used and are they properly maintained?				
41. Are GFCIs provided and being used?				

Unsafe Acts: _____

_____

_____

_____

Notes: _____

_____

_____

_____

ATTACHMENT G

JOB SAFETY ANALYSIS FORM

LANGAN	**Job Safety Analysis (JSA)** **Construction Health and Safety**
JSA TITLE: **JSA NUMBER:**	**DATE CREATED:** **CREATED BY**: **REVISION DATE:** **REVISED BY:**
Langan employees must review and revise the Job Safety Analysis (JSA) as needed to address the any site-specific hazards not identified. Employees must provide their signatures on the last page of the JSA indicating they have review the JSA and are aware the potential hazards associated with this work and will follow the provided preventive or corrective measures.	

PERSONAL PROTECTIVE EQUIPMENT REQUIRED: (PPE): ■ Required ☒ As Needed		
☐ Steel-toed boots	☐ Nitrile gloves	☐ Dermal Protection (Specify)
☐ Long-sleeved shirt	☐ Leather/ Cut-resistant gloves	☐ High visibility vest/clothing
☐ Safety glasses	☐ Face Shield	☐ Hard hat
ADDITIONAL PERSONAL PROTECTIVE EQUIPMENT NEEDED (Provide specific type(s) or descriptions)		
☐ Air Monitoring:	☐ Respirators:	☐ Other:
☐ Dermal Protection:	☐ Cartridges:	☐ Other:

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE OR CORRECTIVE ACTION
1.	1. 2.	1a. 1b. 2a. 2b.
2.	1.	1
Additional items identified in the field.		
Additional Items.		

If additional items are identified during daily work activities, please notify all relevant personnel about the change and document on this JSA.

LANGAN	Job Safety Analysis (JSA) Construction Health and Safety
JSA Title: COVID-19 Awareness – Site Work **JSA Number: JSA046-00**	
A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last-Minute Risk Assessment.	

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Boots	☐ Long Sleeves	☐ Safety Vest (Class 2)	☐ Hard Hat	☐ Hearing Protection
☐ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☐ Nitrile Gloves	☐ PVC Gloves
☐ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Alcohol-based hand sanitizer, disinfectant wipes/spray				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
1. All Activities	1. Transmittal/exposure of COVID-19	1. Ask yourself and your managers – is this work essential? Can this be done remotely? 2. Stay home if sick or showing symptoms of COVID-19 (e.g., fever, cough, etc.). 3. Carry nitrile gloves, alcohol-based hand sanitizer, face coverings and disinfectant wipes/spray during field work. 4. Check federal, state, and/or local travel restrictions **prior** to travel. Many states, counties, and cities are passing strict "shelter-in-place" or business restrictions in response to COVID-19. 5. Immediately notify Beverly Williams or Rory Johnston (Supervisor if employee chooses) if you display symptoms of COVID-19. Symptoms include fever (over 100.4 F), cough, and shortness of breath. 6. Notify Beverly Williams or Rory Johnston, Supervisor and Coronavirus Task Force if you had close contact with an individual who tested positive or displayed symptoms of COVID-19. 7. Do not touch your face, to the extent possible. 8. Wear face coverings when around other worker to minimize spread of COVID-19. (May be required in certain states or locations.)

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		9. Practice social distancing, maintaining at least 6 feet of distance between yourself and others. Avoid gatherings of more than 10 people. Limit, to the extent possible, contact with public items/objects. 10. Clean your hands frequently with soap and water for at least 20 seconds especially after you have been in a public place, or after blowing your nose, coughing, sneezing, or using the rest room. 11. If soap and water are not readily available, use a hand sanitizer that contains at least 60% alcohol. Cover all surfaces of your hands and rub them together until they feel dry. 12. Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow. 13. Clean and disinfect frequently touched surfaces daily, for example, cell phones, computer equipment, headsets, tables, doorknobs, light switches, countertops, handles, desks, toilets, faucets, and sinks.
2. Travel to Jobsite	1. Transmittal/exposure of COVID-19 between passengers 2. Transmittal/exposure of COVID-19 from previous occupants (rental and fleet vehicles) 3. Transmittal/exposure of COVID-19 while refueling	1. Limit the number of occupants to each vehicle to 2 people. Employees should sit as far away from each other as possible. 2. Disinfect high "hand-traffic" areas of the vehicle: Door handles, steering wheel, turn signal and control rods, dashboard controls, seatbelts, armrests, etc. To the extent possible, do not use recycled air for heat/AC and travel with the windows open. 3. Use hand sanitizer before and after pumping gas and only return to the inside of the vehicle after refueling is complete. 4. Wear nitrile gloves if available or disinfect the keypad, pump handle, and fuel grade button prior to use. 5. Recommend face coverings are worn to minimize spread of COVID-19.
3. Conduct Tailgate Safety Meeting & Complete H&S Paperwork	1. Transmittal/exposure of COVID-19 between meeting participants	1. Practice social distancing, maintaining at least 6 feet of distance between yourself and others. 2. Recommend face coverings are worn when around other workers to minimize spread of COVID-19, 3. Hold meetings outside and keep in mind wind direction. To the extent possible, remain crosswind from other people. 4. Designate a single person to maintain sign-in sheets/permits throughout the day to limit the passing of pens/clipboards between people. 5. Each person should complete their own JSA, even if they are completing similar tasks as others in order to limit the passing of paper/pens/clipboards between people. 6. Include COVID-19 topics and prevention measures in safety meetings.
4. Conduct Site Work	1. Transmittal/exposure of COVID-19 between site workers and public.	1. Practice social distancing maintaining 6 feet of distance between yourself and others. 2. Recommend face coverings are worn when around other workers to minimize spread of COVID-19, 3. To the extent possible, do not interact with the public. If it is necessary, politely explain you are practicing social distance and request they stay at least 6 feet away and they do not attempt to pass objects to you. 4. Wear nitrile gloves during site work underneath the appropriate gloves for your task. Utilize appropriate decontamination procedures, securely bag all waste (including nitrile gloves) generated during site work and dispose of.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		5. Do not share tools. Each person should be equipped with the tools to complete their task or tasks should be divided to remove the need to share tools. If tools must be shared, surfaces should be disinfected. 6. Clean and disinfect surfaces of rental tools and equipment upon receipt. To the extent possible rent equipment from Langan's internal equipment reservation center, where cleaning/disinfecting procedures can be verified.
5. Use of Construction Trailers	1. Transmittal/exposure of COVID-19 between site workers and others.	1. Avoid use of shared trailers, if possible. Minimize trailer use to essential personnel. 2. Practice social distancing; maintaining 6 feet of distance between yourself and others in trailer. 3. Clean and disinfect areas including desks, phones, chairs, and other common areas, before and after use.
6. Purchasing Food from a Restaurant	1. Transmittal/exposure of COVID-19 from other customers, staff, surfaces.	1. To the extent possible, bring your own food. 2. If you must visit a restaurant, call ahead for take-out or "contactless delivery." Do not dine in. When picking up food, follow guidelines for Job Step #8: Purchasing Supplies at Retail/Shipping Centers. 3. Wash hands before and after eating.
7. Smoking Cigarettes	1. Transmittal/exposure of COVID-19 by touching mouth with hands	1. Cigarette smokers are at greater risk of complications arising from COVID-19. Nicotine patches/lozenges/gum, smoking cessation programs, and prescription medications may aid in "kicking the habit" if you decide to quit. 2. Wash hands thoroughly before and after smoking. 3. Discard cigarette butts properly. Do not light cigarettes from others and do not give cigarettes to others.
8. Hotel Stay	1. Transmittal/exposure of COVID-19 from previous occupants, hotel staff, common areas.	1. Verify the hotel chain/brand has modified cleaning procedures to reflect risk of COVID-19. Most hotel companies have issued statements on their websites and in email blasts reflecting these new procedures. 2. Use the front door, and not peripheral entrances. Front doors of hotels are usually automatic. 3. Request ground floor room to avoid elevator use and a room that has not be utilized in 48-72 hours. 4. If elevator use is required, do not directly touch elevator buttons with your hands. Do not ride elevators with other people, to the extent possible. 5. Bring disinfecting wipes or sanitizing spray. Upon arrival, disinfect high "hand-traffic" areas of the hotel room: Door handles, light switches, shower/sink faucet handles, TV remote, curtain/blind handles. Clean these surfaces daily. 6. Place the "Do Not Disturb" Sign on your door to prevent people (housekeeping) from entering your room. 7. Avoid common spaces and hotel sponsored events where crowds will be present. 8. Confirm hotel cleaning procedures have been modified to address COVID-19. Confirm no COVID-19 cases have occurred in hotel
9. Purchasing Supplies at Retail/Shipping Centers	1. Transmittal/exposure of COVID-19 from other customers, staff, surfaces.	1. Plan your travel to limit the need to visit retail/shipping centers. 2. Practice social distancing, maintaining at least 6 feet of distance between yourself and others. If the store is too crowded/small, consider visiting another store or returning at a different time. 3. Avoid high "hand-traffic" items/areas like door handles (i.e. use your shoulder, hip/butt, or open with a disposable napkin/paper towel), credit cards terminals (i.e. use Apple/Android pay if available), shopping carts/baskets (i.e. bring your own shopping

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		bags), counter tops (i.e. ask clerk if you can hold the items while they are scanned) and bulk/buffet items (i.e. just avoid them). 4. Disinfect your hands before and after visiting a retail/shipping center.

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN	Job Safety Analysis (JSA) Construction Health and Safety
JSA Title: Environmental Sampling **JSA Number:** JSA021-01 **A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last-Minute Risk Assessment.**	 **S** – ***Stop,*** *what has changed?* **T** – ***Think*** *about the task* **E** – ***Evaluate*** *potential hazards* **P** – ***Plan*** *safe approach* **S** - ***Start*** *task / **Stop** & regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☐ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☐ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☒ Fire Resistant Clothing	☐ Rubber Boots
☒ Insect/Animal Repellent	☒ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Tyvek Sleeves				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
1. Drive to sample location	1. Rough/Off Road terrain	1. Pay attention to road conditions such as road erosion, unprotected embankments, and soft road conditions.
2. Sample Collection (Walking)	1. Slip/Trips/Falls 2. Back strains 3. Wildlife (Insects, Stray animals, rodents) 4. Poisonous vegetation	1. Minimize distance to sample area/ Plan route and check surface prior to carrying heavy equipment/ Locate safest access point/ Follow good housekeeping procedures/ Mark significant below grade hazards (holes, trenches) with spray paint or cones/ Wear foot protection with ankle support and gripping soles. 2. Use proper lifting techniques/ Use wheeled transport/ Obtain assistance where and when needed/ Consider load weight when evaluating what is safe and unsafe to carry. 3. Be aware of surroundings for the presence of wildlife. Do not approach stray animals. Carry and use animal repellant when needed/ Use bug spray when needed. 4. Keep skin covered/ Identify and avoid poisonous vegetation/ Clean areas after contact with suspected vegetation.
3. Sample Collection (Water)	1. Drowning Hazards 2. Chemical burns (when adding acid preservative to sample) 3. Back Strains 4. Ergonomic issues 5. Slip/Trips/Falls	1. Use buddy system/ Wear flotation vest if water is deeper than 2 feet or swift moving/ Select working area with stable footing. Do not attempt to cross or stand in swift moving water. 2. Wear proper PPE (Nitrile gloves, Tyvek Sleeves) 3. Use proper lifting techniques/ Use wheeled transport/ Obtain assistance where and when needed/ Consider load weight when evaluating what is safe or unsafe to carry. 4. When possible, avoid bending over for long periods of time/ Use a small stool for sitting or knee pad for kneeling.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		5. Minimize distance to sample area/ Plan route and check surface prior to carrying heavy equipment/ Locate safest access point/ Follow good housekeeping procedures/ Mark significant below grade hazards (holes, trenches) with spray paint or cones/ Wear foot protection with ankle support and gripping soles/ Avoid standing water or slippery terrain.
4. All activities	1. Slips/ Trips/ Falls 2. Hand injuries, cuts, or lacerations during manual handling of materials 3. Foot injuries 4. Back injuries 5. Traffic 6. Wildlife: Stray dogs, Mice/rats, Vectors (i.e., mosquitoes, bees, etc.) 7. High Noise levels 8. Overhead hazards 9. Heat Stress/ Cold Stress 10. Eye Injuries	1. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves 3. Wear Langan approved safety shoes 4. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 5. Wear high visibility clothing & vest / Use cones or signs to designate work area 6. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 7. Wear hearing protection 8. Wear hard hat / Avoid areas where overhead hazards exist. 9. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 10. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Construction Health and Safety

JSA Title: **Subsurface Investigation**
JSA Number: **JSA030-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last-Minute Risk Assessment.



PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☒ Safety Goggles	☐ Face Shield	☐ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☒ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Dielectric Overshoes, Sun Block				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
5. Transport equipment to work area	2. Back/strain 3. Slip/Trip/Falls 4. Traffic 5. Cuts/abrasions/contusions from equipment 6. Accidents due to vehicle operations	1. Use proper lifting techniques/Use wheeled transport 2. Minimize distance to work area/unobstructed path to work area/follow good housekeeping procedures 3. Wear proper PPE (high visibility vest or clothing) 4. Wear proper PPE (leather gloves, long sleeves, Langan approved safety shoes) 5. Observe posted speed limits/ Wear seat belts at all times
6. Traffic	1. Hit by moving vehicle	1. Use traffic cones and signage/ Use High visibility traffic vests and clothing/ Caution tape when working near active roadways.
7. Field Work (drilling, resistivity testing, and inspection)	1. Biological Hazards: insects, rats, snakes, poisonous plants, and other animals 2. Heat stress/injuries 3. Cold Stress/injuries 4. High Energy Transmission Lines 5. Underground Utilities 6. Electrical (soil resistivity testing)	1. Inspect work area to identify biological hazards. Wear light colored long sleeve shirt and long pants/ Use insect repellant as necessary/ Beware of tall grass, bushes, woods, and other areas where ticks may live/ Avoid leaving garbage on site to prevent attracting animals/ Identify and avoid contact with poisonous plants/Beware of rats, snakes, or stray animals. 2. Wear proper clothing (light colored)/ drink plenty of water/ take regular breaks/use sun block. 3. Wear proper clothing/ dress in layers/ take regular breaks. 4. Avoid direct contact with high energy transmission lines/ position equipment at least 15 feet or as required by PSE&G from the transmission lines/ wear proper PPE (dielectric overshoes 15 kV minimum rating).

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		5. Call one-call service before performing intrusive field work/ Review utility mark-outs and available utility drawings (with respect to proposed work locations)/ Follow Underground Utility Guidelines 6. See AGI Sting R1 operating manual for specific concerns during operating instrument
8. All activities	1. Slips/ Trips/ Falls 2. Hand injuries, cuts, or lacerations during manual handling of materials 3. Foot injuries 4. Back injuries 5. Traffic 6. Wildlife: Stray dogs, Mice/rats, Vectors (i.e., mosquitoes, bees, etc.) 7. High Noise levels 8. Overhead hazards 9. Heat Stress/ Cold Stress 10. Eye Injuries	7. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards. 8. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves. 9. Wear Langan approved safety shoes. 10. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible. 11. Wear high visibility clothing & vest / Use cones or signs to designate work area. 12. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed. 13. Wear proper hearing protection. 14. Wear hard hat / Avoid areas where overhead hazards exist. 15. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress. 16. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN	Job Safety Analysis (JSA) Construction Health and Safety
JSA Title: Field Sampling **JSA Number:** JSA022-01 **A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last-Minute Risk Assessment.**	 S – *Stop,* what has changed? T – *Think* about the task E – *Evaluate* potential hazards P – *Plan* safe approach S - *Start* task / *Stop* & regroup

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☐ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
9. Unpack/Transport equipment to work area.	7. Back Strains 8. Slip/Trips/Falls 9. Cuts/Abrasions from equipment 10. Contusions from dropped equipment	6. Use proper lifting techniques/Use wheeled transport. 7. Minimize distance to work area/Unobstructed path to work area/follow good housekeeping procedures. Mark slip/trip/fall hazards with orange safety cones. 8. Wear proper PPE (leather gloves, long sleeves). 9. Wear proper PPE (Langan approved safety shoes).
10. Initial Site Arrival-Site Assessment	5. Traffic	5. Situational awareness (be alert of your surroundings). Secure area from through traffic.
11. Surface Water Sampling	6. Contaminated media. Skin/eye contact with biological agents and/or chemicals.	6. Wear appropriate PPE (Safety glasses, appropriate gloves). Review (M)SDS for all chemicals being.
12. Sampling from bridges	1. Struck by vehicles	1. Wear appropriate PPE (Safety Vest). Use buddy system and orange safety cones.
13. Icing of Samples/ Transporting coolers/equipment from work area.	11. Back Strains 12. Slips/Trips/Falls 13. Cuts/Abrasions from equipment 14. Pinch/Crushing Hazards.	17. Drain coolers of water. Use proper lifting techniques. Use wheeled transport. 18. Have unobstructed path from work area. Aware of surroundings. 19. Wear proper PPE (Leather gloves, long sleeves) 20. Wear proper PPE (Leather gloves, long sleeves)
14. Site Departure	1. Contaminated PPE/Vehicle	1. Contaminated PPE should be disposed of on-site. Remove boots and soiled clothing for secure storage in trunk. Wash hands promptly.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
15. All activities	1. Slips/ Trips/ Falls 2. Hand injuries, cuts, or lacerations during manual handling of materials 3. Foot injuries 4. Back injuries 15. Traffic 16. Wildlife: Stray dogs, Mice/rats, Vectors (i.e., mosquitoes, bees, etc.) 17. High Noise levels 18. Overhead hazards 19. Heat Stress/ Cold Stress 20. Eye Injuries	1. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves 3. Wear Langan approved safety shoes 4. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 21. Wear high visibility clothing & vest / Use cones or signs to designate work area. 22. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed. 23. Wear hearing protection 24. Wear hard hat / Avoid areas where overhead hazards exist. 25. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress. 26. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN	Job Safety Analysis (JSA) Construction Health and Safety
JSA Title: Equipment Transportation and Set-up **JSA Number:** JSA012-01	 **S** – ***Stop,*** *what has changed?* **T** – ***Think*** *about the task* **E** – ***Evaluate*** *potential hazards* **P** – ***Plan*** *safe approach* **S** - ***Start*** *task /* ***Stop*** *& regroup*
A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last-Minute Risk Assessment.	

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☐ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
16. Transport equipment to work area	11. Back Strain 12. Slips/ Trips/ Falls 13. Traffic 14. Cuts/abrasions from equipment 15. Contusions from dropped equipment	1. Use proper lifting techniques / Use wheeled transport. 2. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures. 3. Wear proper PPE (high visibility vest or clothing) 4. Wear proper PPE (leather gloves, long sleeves) 5. Wear proper PPE (safety shoes)
17. Moving equipment to its planned location	6. Pinch Hazard 7. Slips/ Trips/ Falls	1. Wear proper PPE (leather gloves) 2. Be aware of potential trip hazards / Practice good housekeeping procedures / Mark significant below-grade hazards (i.e., holes, trenches) with safety cones or spray paint
18. Equipment Set-up	7. Pinch Hazard 8. Cuts/abrasions to knuckles/hands. 9. Back Strain	1. Wear proper PPE (leather gloves) 2. Wear proper PPE (leather gloves) 3. Use proper lifting techniques / Use wheeled transport
19. All activities	21. Slips/ Trips/ Falls 22. Hand injuries, cuts, or lacerations during manual handling of materials 23. Foot injuries 24. Back injuries 25. Traffic 26. Wildlife: Stray dogs, Mice/rats, Vectors (i.e., mosquitoes, bees, etc.)	27. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards. 28. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves. 29. Wear Langan approved safety shoes.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
4. All activities (cont'd)	27. High Noise levels 28. Overhead hazards 29. Heat Stress/ Cold Stress 30. Eye Injuries	30. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible. 31. Wear high visibility clothing & vest / Use cones or signs to designate work area. 32. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed. 33. Wear hearing protection 34. Wear hard hat / Avoid areas where overhead hazards exist. 35. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress. 36. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Construction Health and Safety

JSA Title: 55-gallon Drum Sampling
JSA Number: JSA043-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last-Minute Risk Assessment.



S – *Stop, what has changed?*
T – *Think about the task*
E – *Evaluate potential hazards*
P – *Plan safe approach*
S - *Start task / Stop & regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☐ Hearing Protection
☒ Safety Glasses	☒ Safety Goggles	☒ Face Shield	☒ Nitrile Gloves	☒ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: All Drums are required to be labeled. Langan employees do not open or move undocumented drums or unlabeled drums without proper project manager authorization.				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
20. Unpack/Transport equipment to work area.	16. Back Strains 17. Slip/Trips/Falls 18. Cuts/Abrasions from equipment 4. Contusions from dropped equipment	10. Use proper lifting techniques/Use wheeled transport. 11. Minimize distance to work area/Unobstructed path to work area/follow good housekeeping procedures. Mark slip/trip/fall hazards with orange safety cones. 12. Wear proper PPE (leather gloves, long sleeves). 4. Wear proper PPE (Langan approved safety shoes).
21. Open Drums	1. Hand Injuries, cuts or lacerations when untightening drum locking bolt, removing drum lid strap, or removing lid. 2. Pressure from drums.	1. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves. Use non-metallic mallet and non-sparking tools/wrenches. 2. Open drum slowly to relieve pressure. Wear proper PPE: face shield and goggles; correct gloves; and over garments.
22. Collecting Soil/Fluid Sample	8. Irritation to eye from vapor, soil dust, or splashing. 9. Irritation to exposed skin	6. Wear proper eye protection including safety glasses/ face shield/googles and when necessary, splash guard. If dust or vapor phase is present, wear appropriate safety breathing gear (1/2 mask or full face mask with correct filter) 7. Wear proper skin protection including nitrile gloves.
23. Closing Drums	1. Hand Injuries, cuts or lacerations when untightening drum locking bolt, removing drum lid strap, or removing lid.	7. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves. Use non-metallic mallet and non-sparking tools/wrenches.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
24. Moving Drums	2. Hand Injuries, cuts or lacerations when untightening drum locking bolt, removing drum lid strap, or removing lid. 3. Back Strains	2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves. Use non-metallic mallet and non-sparking tools/wrenches. 3. Use proper lifting techniques/Use wheeled transport.
25. All activities	31. Slips/ Trips/ Falls 32. Hand injuries, cuts, or lacerations during manual handling of materials 33. Foot injuries 34. Back injuries 35. Traffic 36. Wildlife: Stray dogs, Mice/rats, Vectors (i.e., mosquitoes, bees, etc.) 37. High Noise levels 38. Overhead hazards 39. Heat Stress/ Cold Stress 40. Eye Injuries	37. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards. 38. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves. 39. Wear Langan approved safety shoes. 40. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible. 41. Wear high visibility clothing & vest / Use cones or signs to designate work area. 42. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed. 43. Wear hearing protection 44. Wear hard hat / Avoid areas where overhead hazards exist. 45. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress. 46. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Construction Health and Safety

JSA Title: Direct-Push Soil Borings
JSA Number: JSA004-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last-Minute Risk Assessment.



S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT REQUIRED:				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☒ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Half-face respirator, dust cartridges, PID (if applicable)				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
26. Move equipment to work site	19. Back strain when lifting equipment. 20. Slips/ Trips/ Falls while moving equipment. 21. Traffic (if applicable) 22. Pinched fingers or running over toes during GeoProbe set-up. 23. Overturn drilling rig while transporting to loading dock on flat-bed tow truck	13. Use proper lifting technique (use legs for bending and lifting and not the back)/ Use wheeled transport for heavy equipment / Get assistance when handling loads greater than 50 lbs. / Minimize distance to vehicle 14. Use proper lifting technique (use legs for bending and lifting and not the back) / Use wheeled transport for heavy equipment / Get assistance when handling loads greater than 50 lbs. / Minimize distance to vehicle / Have unobstructed path to vehicle or collection point / Do not lift/walk with boxes that are heavy/difficult to lift 15. Wear high visibility safety vests or clothing / Exercise caution 16. Wear proper PPE (cut-resistant gloves) / Stay alert, be aware of geoprobe rig at all times 17. Drill rig should be parked in center of flat-bed tow truck / Emergency brake shall be used at all times during transport on the flat-bed truck/ All unnecessary personnel should stay away from the flat-bed truck during moving activities
27. Calibration of monitoring equipment	10. Skin or eye contact with calibration chemicals 11. Pinch fingers in monitoring equipment	8. Wear proper PPE (safety glasses/ goggles) 9. Wear proper PPE (leather gloves)
28. Set-up GeoProbe rig	10. Geoprobe rig movement	8. All field personnel should stay clear of the GeoProbe rig while moving / Use a spotter when backing up the GeoProbe
29. Advance GeoProbe rods below ground surface to desired depth	4. Underground utilities 5. High noise levels	4. Clean all subsurface soil borings to a minimum of 5 feet below grade. 5. Wear proper PPE (hearing protection)
30. Remove and open acetate liner.	41. Pinched fingers while removing macrocore.	1. Wear proper PPE (nitrile gloves, cut-resistant or leather gloves 2. Wear proper PPE (cut-resistant or leather gloves)

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
5. Remove and open acetate liner (cont'd)	42. Cuts/lacerations when cutting acetate liner open. 43. Exposure to hazardous vapors 44. Skin contacts with contaminated soil	3. Do not place face over acetate liner when opening / Monitor hazardous vapors in air with PID / Upgrade PPE as necessary based on levels contained in the Construction Health and Safety Plan 4. Wear proper PPE (nitrile gloves)
31. Sample Collections a) Monitor parameters. b) Prepare sample containers and labels	1. Contact with potentially contaminated soil. 2. Lacerations from broken sample bottles 3. Back strain while transporting full coolers. 4. Internal exposure to contaminants and metals through inhalation of dust 5. Slips/ Trips/ Falls	1. Use monitoring devices / Wear proper PPE (safety glasses, nitrile gloves) 2. Do not over-tighten bottle caps / Handle bottles safely to prevent breakage. 6. Use proper lifting techniques / Do not lift heavy loads without assistance. 7. Avoid creating dust / If necessary, wear a half mask respirator with applicable dust cartridge / Inspect respirator for damage and cleanliness prior to use / Clean respirator after each use and store in a clean, secure location. 8. Be alert / Follow good housekeeping procedures
32. Remove excess soil from acetate liner and place in 55-gallon drum (IF NOT PERFORMED BY LANGAN, REMOVE!)	1. Cuts/lacerations from acetate liner 2. Pinched fingers/hand while opening/closing drum. 3. Skin contacts with contaminated soil 4. Soil debris in eyes	1. Wear proper PPE (cut-resistant or leather gloves) 2. Wear proper PPE (cut-resistant or leather gloves) 3. Wear proper PPE (nitrile gloves) 4. Wear proper PPE (safety glasses)

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
8. Transport drums to central staging location (IF NOT PERFORMED BY LANGAN, REMOVE!)	1. Back, arm or shoulder strain from moving drums. 2. Pinch fingers/hand in drum cart when moving drums. 3. Pinch fingers/hand when operating lift-gate on vehicle. 4. Contact with potentially contaminated groundwater when moving improperly sealed drums. 5. Slips when moving drums. 6. Drop drum on feet/toes	47. Use drum cart for moving drums / Use proper lifting techniques / Do not lift heavy loads without assistance. 48. Wear proper PPE (cut-resistant or leather gloves) 49. Wear proper PPE (cut-resistant or leather gloves) 50. Wear proper PPE (nitrile gloves underneath work gloves) 51. Follow good housekeeping procedures / Ensure route to move drum and storage space is free from obstructions. 52. Wear proper PPE (safety shoes) / Work in a safe manner to prevent dropped drum
9. All activities 9. All activities (cont'd)	1. Slips/ Trips/ Falls 2. Hand injuries, cuts, or lacerations during manual handling of materials 3. Foot injuries 4. Back injuries 5. Traffic 6. Wildlife: Stray dogs, Mice/rats, Vectors (i.e., mosquitoes, bees, etc.) 7. High Noise levels 8. Overhead hazards 9. Heat Stress/ Cold Stress 10. Eye Injuries	1. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards. 2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves. 3. Wear Langan approved safety shoes. 4. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible. 5. Wear high visibility clothing & vest / Use cones or signs to designate work area. 6. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed. 7. Wear hearing protection 8. Wear hard hat / Avoid areas where overhead hazards exist. 9. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress. 10. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date

Prepared by:		
Reviewed by:		

LANGAN	Job Safety Analysis (JSA) Construction Health and Safety
JSA Title: Geophysical Investigation **JSA Number:** JSA023-01	 **S** – ***Stop,*** *what has changed?* **T** – ***Think*** *about the task* **E** – ***Evaluate*** *potential hazards* **P** – ***Plan*** *safe approach* **S** - ***Start*** *task /* ***Stop*** *& regroup*
A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last-Minute Risk Assessment.	

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☒ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
33. Transport equipment to work area	24. Back/strain 25. Slip/Trip/Falls 26. Traffic 27. Cuts/abrasions/contusions from equipment	18. Use proper lifting techniques/Use wheeled transport 19. Minimize distance to work area/unobstructed path to work area/follow good housekeeping procedures 20. Wear proper PPE (high visibility vest or clothing) 21. Wear proper PPE (leather gloves, long sleeves, Langan approved safety shoes)
34. Supervision of subcontractor and all other activities	12. Slip/Trips/Falls 13. Hand injuries 14. Foot injuries 15. Back injuries/Strains 16. Traffic 17. Wildlife a. Wildlife b. Mice/rats c. Vectors (i.e., mosquitoes, bees, etc.) 7. Heat/Cold Stress	10. Be aware of potential trip hazards/follow good housekeeping procedures/mark significant below-grade hazards (i.e., holes, trenches, wires, ropes) with safety cones or spray paint. 11. Wear proper PPE (leather gloves)/watch wear you place your hands/inspect material or equipment for jagged, rough, or slippery surfaces/ watch for pinch points/ wipe off slippery, wet, or dirty items prior to handling. 12. Wear proper PPE (Langan approved safety shoes)/ Be aware of uneven terrain) 13. Use proper lifting techniques/ Buddy system when lifting/ use wheeled transport. 14. Wear proper PPE (high-visibility shirts and vests)/ use cones if appropriate/ notify equipment operators of work area. 15. Be aware of surroundings at all times for the presence of wildlife. a. Do not approach stray animals. b. Carry animal repellant/ use if situation arises. c. Use bug spray when needed. 7. Wear proper attire for weather conditions (sunscreen, protective clothing in

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		sunlight or layer clothing in cold weather)/ drink plenty of fluids/ take regular breaks.
35. All activities	45. Slips/ Trips/ Falls 46. Hand injuries, cuts, or lacerations during manual handling of materials 47. Foot injuries 48. Back injuries 49. Traffic 50. Wildlife: Stray dogs, Mice/rats, Vectors (i.e., mosquitoes, bees, etc.) 51. High Noise levels 52. Overhead hazards 53. Heat Stress/ Cold Stress 54. Eye Injuries	53. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards. 54. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves. 55. Wear Langan approved safety shoes. 56. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible. 57. Wear high visibility clothing & vest / Use cones or signs to designate work area. 58. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed. 59. Wear proper hearing protection. 60. Wear hard hat / Avoid areas where overhead hazards exist. 61. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress. 62. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Ladder Use**
JSA Number: **JSA056**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.



S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☐ Long Sleeves	☐ Safety Vest (Class 2)	☐ Hard Hat	☐ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☐ Nitrile Gloves	☐ PVC Gloves
☐ Leather Gloves	☐ Cut Resist. Gloves	☒ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
36. Use of Ladders and Inspection of Ladders Before Use	1. Ladders (portable, fixed) 2. Rolling or pinching objects 3. Sharp objects	22. Inspect all ladders for structural defects prior to each use. Decals, weight restrictions, non painted surfaces. 23. Use the correct type and size of ladder to safely work. 24. . Do not use metal or wooden ladders
37. Use of Ladder(s)	18. Ladders (portable, fixed) 19.Elevated work platform or stairs 20.Slippery surfaces (water, ice, snow) 21.Rolling or pinching objects 22.Sharp objects 23.Poor Housekeeping 24.Repetitive motion or other ergonomic concerns 25.Airborne dust	16. Maintain three points of contact when ascending and descending ladders. 17. Insure area at bottom of ladder is free of obstructions and tripping hazards. 18. Never carry tools in your hands while ascending or descending a ladder. 19. Utilize rope buckets to pull tools up to you or tool belts. Extension ladders will extend up to 36 inches above the landing that is being accessed and be tied off and secured to prevent them from moving or falling. 20. A spotter must hold the ladder if the employee needs to climb the ladder to tie the ladder off. When using an extension ladder, for every 4' of rise, the base must come out 1' (4 to 1 ratio)

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		21. If working from a ladder 6 ft. or higher, fall protection is required. Fall protection is not required for climbing ladders less than 20 ft. in height. 22. Use the proper ladder for the job at all times. 23. The belt buckle may never extend past either rail on the side of the ladder. 24. Do not climb higher than the second tread from the top on a stepladder or the third rung 25. Before ascending or descending a ladder, wait until other workers have completely cleared the ladder. Do not stand directly below a person who is climbing or descending a ladder to avoid falling objects.
38. All activities	55. Slips/ Trips/ Falls 56. Hand injuries, cuts or lacerations during manual handling of materials 57. Foot injuries 58. Back injuries 59. Eye Injuries	63. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 64. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 65. Wear proper PPE (Langan approved safety shoes) 66. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 67. Wear high visibility clothing & vest / Use cones or signs to designate work area 68. Wear hard hat / Avoid areas were overhead hazards exist. 69. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 70. Wear safety glasses

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Mechanical Connection Oversight**
JSA Number: **JSA027-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.



S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☒ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☒ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
39. Transport equipment to work area	28. Back Strain 29. Slips/ Trips/ Falls 30. Traffic 31. Cuts/abrasions from equipment 32. Contusions from dropped equipment	6. Use proper lifting techniques / Use wheeled transport 7. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 8. Wear proper PPE (high visibility vest or clothing) 9. Wear proper PPE (leather gloves, long sleeves) 10. Wear proper PPE (Langan approved safety shoes)
40. Piping and connections	6. Pinch Hazard 7. Cuts/abrasions to knuckles/hands 8. Back Strain 9. High pressure water spray	1. Wear proper PPE (leather gloves) 2. Wear proper PPE (leather gloves or cut resistant gloves) 3. Use proper lifting techniques / Use wheeled transport 4. Ensure connections are tight and secure/ Wear proper PPE (face shield and safety glasses)
41. All activities	60. Slips/ Trips/ Falls 61. Hand injuries, cuts or lacerations during manual handling of materials 62. Foot injuries 63. Back injuries 64. Traffic 65. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 66. High Noise levels 67. Overhead hazards 68. Heat Stress/ Cold Stress 69. Eye Injuries	71. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 72. Inspect for jagged/sharp edges, rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather and/or cut-resistant gloves 73. Wear Langan approved safety shoes 74. Use proper lifting techniques / Consider load location, task repetition, and load weigh / Obtain assistance when possible 75. Wear high visibility clothing & vest / Use cones or signs to designate work area 76. Be aware of surroundings for presence of wildlife/ Do not approach stray animals / Carry or use animal repellant / Use bug spray when needed

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		77. Wear proper PPE (hearing protection) 78. Wear hard hat / Avoid areas were overhead hazards exist. 79. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 80. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: Soil Sampling from Excavator Bucket
JSA Number: JSA057

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.



S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task / **Stop** & regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☐ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☐ Hearing Protection
☒ Safety Glasses	☒ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☐ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
42. Drive to site and/or sample location.	33. Rough/Off-Road terrain; 34. Low-light or other hazardous environmental conditions.	1. Pay attention to road conditions such as road erosion, unprotected embankments, and soft road conditions; 2. Ensure vehicle is properly equipped and outfitted for the terrain and all environmental conditions.
43. Initial Site Arrival Site Assessment.	1. Unsafe driving conditions including personnel walking within driving areas, open excavation or pits, steep slopes etc.; 2. Biological hazards (snakes, poison oak, bees).	1. Maintain situational awareness upon arriving to the work site (be alert of your surroundings). Secure the work area from through traffic.
44. Unpack and transport equipment to work area.	1. Back Strains; 2. Slip/Trips/Falls; 3. Cuts/Abrasions from equipment; 4. Contusions from dropped equipment.	1. Use proper lifting techniques and use wheeled transport; 2. Minimize distance to work area and create unobstructed path to work area. Follow good housekeeping procedures. Mark slip/trip/fall hazards with orange safety cones and/or caution tape; 3. Wear proper PPE (gloves, long sleeves, etc.); 4. Wear proper PPE (Langan-approved safety shoes, hardhat, etc.).
45. Earth Moving Equipment.	1. Equipment striking, crushing, running over employee etc.	1. Place traffic cones and use caution tape to clearly delineate the excavators front and rear swing radius. Do not enter the excavators or other heavy equipment swing radius/travel paths while in operation; 2. Ensure all employees working in the vicinity of the excavator/heavy equipment maintain direct line of sight with the operator at all times; don't walk behind equipment or within the operators blind spots; maintain a safe distance away from the equipment; 3. Designate one employee as the "spotter" to communicate with the excavator operator, and establish a shut-down signal that, when

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		sounded, instructs the excavator operator to freeze/stop all movement of the equipment; 4. Direct operator to completely power down the excavator before approaching (i.e. breaking the swing radius plane) the excavator bucket to collect a sample; 5. Direct the operator keep the equipment completely powered-down until all employees are at a safe distance, and it is safe to continue work. The designated spotter should be the only person directing the operator to power the equipment back on. 6. Conduct a planned pause anytime there is a change in procedure or before beginning a new task; 7. Wear proper PPE (high vis vest/clothing).
46. Icing of Samples & Transporting coolers/equipment from work area.	1. Back Strains 2. Slips/Trips/Falls 3. Cuts/Abrasions from equipment 4. Pinch/Crushing Hazards.	1. Drain coolers of water. Use proper lifting techniques. Use wheeled transport whenever possible; 2. Plan for and utilize a safe and unobstructed path of travel to and from work area. Maintain situational awareness when traveling to and from work area; 3. Wear proper PPE (Leather gloves, long sleeves); 4. Wear proper PPE (Leather gloves, long sleeves, hard hat, Langan approved safety shoes).
47. Excavated soil.	1. Hazardous substances.	1. Use proper equipment to monitor excavated soil for contaminates; 2. Ensure levels do not exceed PEL's for contaminates; 3. Wear proper PPE.
48. Changing site conditions.	1. Stockpiles and/or excavations/trenches/pits creating unsafe paths of travel. 2. Unforeseen conditions	1. Take time to plan out stockpile, excavation, trench, and/or test pit locations, ensuring that the planned work will not create unsafe conditions or paths of travel once performed; 2. Maintain situational awareness throughout the work day (be alert of the evolving site conditions); 3. If stockpile, excavation, trench, and/or test pit locations create pinch points, site constraints, or unsafe paths of travel or other unsafe site conditions, stop work immediately and direct the excavator operator to correct the unsafe conditions by moving stockpiles, backfilling excavations, trenches, and/or test pits etc.; 4. Use stop work and conduct a planned pause to address changed site conditions.
49. All activities.	1. Slips/ Trips/ Falls; 2. Hand injuries, cuts or lacerations during manual handling of materials; 3. Foot injuries; 4. Back injuries; 5. Traffic; 6. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.); 7. High Noise levels; 8. Overhead hazards; 9. Heat Stress/ Cold Stress; 10. Eye Injuries.	1. Be aware of potential trip hazards. Follow good housekeeping procedures. Mark significant hazards; 2. Inspect for jagged/sharp edges, and rough or slippery surfaces. Keep fingers away from pinch points. Wipe off greasy, wet, slippery or dirty objects before handling. Wear proper PPE (leather/ cut-resistant gloves); 3. Wear proper PPE (Langan approved safety shoes); 4. Use proper lifting techniques. Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift. Obtain assistance when possible; 5. Wear high visibility clothing & vest / Use cones or signs to designate work area;

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		6. Be aware of surroundings at all times, including the presence of wildlife. Do not approach stray dogs. Carry/use dog/animal repellant. Use bug spray when needed; 7. Wear hearing protection; 8. Wear hard hat / Avoid areas were overhead hazards exist; 9. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather). Drink plenty of fluids to avoid dehydration. Take breaks as necessary to avoid heat/cold stress; 10. Wear safety glasses

Print Name	**Sign Name**	**Date**
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Site Inspection**
JSA Number: **JSA024-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.



S – ***Stop,*** *what has changed?*

T – ***Think*** *about the task*

E – ***Evaluate*** *potential hazards*

P – ***Plan*** *safe approach*

S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☒ Rubber Boots
☒ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
50.Jobsite Pre-briefing	35.None	25. Review JSA, SOP's, and discuss hazards that may be present and control measures for present hazards while on-site.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
2. Working near railroads	1. Passing Trains. 2. Slip/Trips/Falls.	1. Wear reflective vest/ Stay away from tracks/ Do not cross tracks within 10 ft. of train car or when there is a train within view/listen for train horn. 2. Be aware of tripping hazards/ Follow good housekeeping procedures/ Mark significant hazards with spray paint or cones.
3. Walking around site	10. Uneven terrain 11. Wildlife: Stray animals, mice/rats, vectors (i.e. mosquitoes, bees, etc.) 12. Weather: Heat/cold stress 13. Slip/Trips/Falls 14. Foot injuries 15. Eye injuries	9. Pay attention to surrounding area (puddles, wet, frozen, uneven areas); Mark with cones or spray paint. 10. Use bug spray/ Avoid stray animals/Use repellant when needed. 11. Dress for the correct weather situation/ Use sunscreen or protective clothing in sunlight, layers in cold weather/ Drink plenty of fluids/ Take breaks when needed. 4. Be aware of tripping hazards/ Follow good housekeeping procedures/ Mark significant hazards with spray paint or cones. 5. Wear proper PPE (Langan approved safety shoes)/ Change wet socks during cold weather. 6. Wear proper PPE (safety glasses/goggles).
4. Working near road	1. Passing vehicles 2. Slip/Trips/Falls	1. Wear reflective vest/ Stay away from roadway/ Use buddy system/ Place signage or cones when needed. 2. Be aware of tripping hazards/ Follow good housekeeping procedures/ Mark significant hazards with spray paint or cones.
5. All activities	70. Slips/ Trips/ Falls 71. Hand injuries, cuts or lacerations during manual handling of materials 72. Foot injuries 73. Back injuries 74. Traffic 75. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 76. High Noise levels 77. Overhead hazards 78. Heat Stress/ Cold Stress 79. Eye Injuries	81. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 82. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 83. Wear Langan approved safety shoes 84. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 85. Wear high visibility clothing & vest / Use cones or signs to designate work area 86. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 87. Wear hearing protection 88. Wear hard hat / Avoid areas were overhead hazards exist. 89. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 90. Wear safety glasses
Additional items.		

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: Groundwater Sampling
JSA Number: JSA008-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last-Minute Risk Assessment.



PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☒ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Tyvek sleeves, Dermal Protection, PID				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
51. Transport equipment to work area	1. Back Strain 2. Slips/ Trips/ Falls 3. Traffic 4. Cuts/abrasions from equipment 5. Contusions from dropped equipment	1. Use proper lifting techniques / Use wheeled transport. 2. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures. 3. Wear proper PPE (high visibility vest or clothing) 4. Wear proper PPE (leather gloves, long sleeves) 5. Wear proper PPE (safety shoes)
52. Remove well cover	26. Scrape knuckles/hand 27. Strain wrist/bruise palm 28. Pinch fingers or hand	3. Wear proper PPE (leather gloves) 4. Using a hammer, tap the end of the wrench to loosen grip of bolts. 5. Wear proper PPE (leather gloves)
53. Remove well cap and lock	11. Well can pops from pressure. 12. Exposure to hazardous substances through inhalation or dermal exposure 13. Scrape knuckles/hand 14. Strain write/bruise palm	5. Remove cap slowly to relieve pressure / Do not place face over well when opening / Wear proper PPE (safety glasses) 6. Use direct air monitoring/reading instrument (i.e., PID) / Be familiar with and follow actions prescribed in the HASP / Wear proper PPE (nitrile gloves) 7. Wear proper PPE (leather gloves) 8. Using hammer, tap the end of the wrench to loosen grip
54. Measure head-space vapor levels	1. Exposure to hazardous substances through inhalation	1. Do not place face over well when collecting measurement
55. Remove dedicated tubing (if necessary)	1. Exposure to hazardous substances through inhalation or dermal exposure 2. Tubing swings around after removal	1. Wear proper PPE (nitrile gloves, Tyvek sleeves) 2. Wear proper PPE (safety glasses)
56. Set-up plastic sheeting for work site around the well	1. Lacerations when cutting plastic sheeting.	1. Use scissors to cut plastic sheeting / Cut motions should always be away from body and body parts

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
57. Measure depth to water	1. Exposure to hazardous substances through inhalation or dermal exposure 2. Pinch fingers or hand in water level instrument	1. Wear proper PPE (nitrile gloves) 2. Wear proper PPE (leather gloves)
58. Calibrate monitoring equipment	1. Skin or eye contact with calibration chemicals 2. Pinch fingers or hand in monitoring equipment	1. Wear proper PPE (safety glasses, nitrile gloves) 2. Wear proper PPE (leather gloves) / Avoid pinch points
59. Install sampling pump in well	1. Hand injuries during installation of pump 2. Lacerations when cutting tubing. 3. Back strain during installation of pump 4. Physical hazards associated with manual lifting of heavy equipment. 5. Back strain from starting generator. 6. Burns from hot exhaust from generator. 7. Electrical shock from improper use of generator and pump 8. Contaminated water spray from loose connections	1. Wear proper PPE (leather gloves, nitrile gloves) 2. Use safety tubing cutter. 3. Use proper lifting techniques. 4. Use proper lifting techniques / Use wheeled transport for heavy equipment. 5. Use arm when starting generator / Do not over-strain if generator does not start. 6. Do not touch generator near exhaust / Use proper handle to carry / Allow generator to cool down before moving. 7. Properly plug in pump to generator / Do not allow the pump or generator to contact water / Check for breaks in the cord. 8. Check all tubing connections to ensure they are tight and secure

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
10. Purge water	1. Contact with potentially contaminated groundwater. 2. Back strain from lifting buckets of water 3. Tripping potential on sample discharge lines and pump electric lines	1. Wear proper PPE (safety glasses, nitrile gloves) 2. Use proper lifting techniques / Use wheeled transport. 3. Organize discharge of electric line to keep out of way as much as possible / Mark potential tripping hazards with caution tape or safety cones
11. Sample water collection	1. Contact with potentially contaminated groundwater through dermal exposure. 2. Contact with and burns from acid used for sample preservation. 3. Tripping potential on sample discharge lines and pump electric lines 4. Lacerations from broken sample bottles 5. Back strain when transporting coolers full of collected samples. 6. Slips/ Trips/ Falls	1. Wear proper PPE (safety glasses, nitrile gloves) 2. Wear proper PPE (safety glasses, nitrile gloves) / Ensure sample bottle lids are secure before use and after sample collection. 3. Organize line to keep out of the way as much as possible / Mark potential tripping hazards with caution tape or safety cones. 4. Do not over-tighten bottle caps / Handle bottles safely to prevent breakage / Wrap glass bottles in bubble wrap, if possible 5. Use proper lifting techniques / Use wheeled transport / Seek assistance if coolers weight exceeds 50lbs. / Minimize distance to vehicle. 6. Have unobstructed path to vehicle or collection point / Follow good housekeeping procedures / Do not lift/walk with coolers that are too heavy/difficult to lift
12. Remove pump and pack up equipment	1. Back strain when removing pump or lifting heavy equipment	1. Use proper lifting technique / Use wheeled transport for heavy equipment
13. Replace well cap and lock	1. Scrape fingers/hand 2. Strain wrist/bruise palm	1. Wear proper PPE (leather gloves) 2. Using hammer, tap the end of the well cap to tighten grip
14. Replace well cover	1. Scrape knuckles/hand 2. Strain write/bruise palm. 3. Pinch fingers or hand	1. Wear proper PPE (leather gloves) 2. Using hammer, tap the end of the wrench to tighten the grip of the bolts. 3. Wear proper PPE (leather gloves)
15. Transport drums to disposal staging location	1. Back, arm or shoulder strain from moving drums. 2. Pinch hazard 3. Contact with potentially contaminated groundwater when moving improperly sealed drums. 4. Slips/ Trips/ Falls when moving drum. 5. Drop drum on feet/toes	1. Use drum cart for moving drums / Use proper lifting techniques / Obtain assistance, if needed 2. Wear proper PPE (leather gloves) 3. Wear proper PPE (nitrile gloves under leather gloves) / Properly seal drum to prevent leak. 4. Ensure route to move drum to storage space is dry and free from obstructions. 5. Wear proper PPE (safety shoes)
16. Place used PPE in designated disposal drum	1. Pressure build-up inside drum 2. Pinch hazard	1. Remove cap from bung hole in drum to relieve pressure. 2. Wear proper PPE (leather gloves)
17. Decontaminate equipment	1. Splashing water/soap from decontamination 2. Contact with potentially contaminated groundwater through dermal exposure. 3. Electrical shock from broken electric cords	1. Wear proper PPE (safety glasses) 2. Wear proper PPE (safety glasses, dermal protection) 3. Properly plug in pump to generator / Do not allow the pump or generator to contact water / Check for breaks in the cord
18. All activities	80. Slips/ Trips/ Falls 81. Hand injuries, cuts, or lacerations during manual handling of materials 82. Foot injuries 83. Back injuries 84. Traffic 85. Wildlife: Stray dogs, Mice/rats, Vectors (i.e., mosquitoes, bees, etc.)	91. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards. 92. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves. 93. Wear Langan approved safety shoes.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
	86. High Noise levels 87. Overhead hazards 88. Heat Stress/ Cold Stress 89. Eye Injuries	94. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible. 95. Wear high visibility clothing & vest / Use cones or signs to designate work area. 96. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed. 97. Wear hearing protection 98. Wear hard hat / Avoid areas where overhead hazards exist. 99. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress. 100. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Well Installation**
JSA Number: **JSA019-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last-Minute Risk Assessment.



S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT REQUIRED:				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: PID, Tyvek sleeves				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
60. Move equipment to work site	36. Back strain when lifting equipment. 37. Slips/ Trips/ Falls while moving equipment. 38. Traffic (if applicable) 39. Pinched fingers or running over toes during GeoProbe set-up. 40. Overturn drilling rig while transporting to loading dock on flat-bed tow truck	26. Use proper lifting technique (use legs for bending and lifting and not the back)/ Use wheeled transport for heavy equipment / Get assistance when handling loads greater than 50 lbs. / Minimize distance to vehicle 27. Use proper lifting technique (use legs for bending and lifting and not the back) / Use wheeled transport for heavy equipment / Get assistance when handling loads greater than 50 lbs. / Minimize distance to vehicle / Have unobstructed path to vehicle or collection point / Do not lift/walk with boxes that are heavy/difficult to lift 28. Wear high visibility safety vests or clothing / Exercise caution 29. Wear proper PPE (cut-resistant gloves) / Stay alert, be aware of geoprobe rig at all times 30. Drill rig should be parked in center of flat-bed tow truck / Emergency brake shall be used at all times during transport on the flat-bed truck/ All unnecessary personnel should stay away from the flat-bed truck during moving activities
61. Calibration of monitoring equipment	29. Skin or eye contact with calibration chemicals 30. Pinch fingers in monitoring equipment	26. Wear proper PPE (safety glasses/ goggles) 27. Wear proper PPE (leather gloves)
28. Set-up GeoProbe rig	15. Geoprobe rig movement	9. All field personnel should stay clear of the GeoProbe rig while moving / Use a spotter when backing up the GeoProbe
29. Advance GeoProbe rods below ground surface to desired depth	16. Underground utilities 17. High noise levels	12. Clean all subsurface soil borings to a minimum of 5 feet below grade. 13. Wear proper PPE (hearing protection)

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
30. Remove and open acetate liner. 5. Remove and open acetate liner (cont'd)	90. Pinched fingers while removing macrocore. 91. Cuts/lacerations when cutting acetate liner open. 92. Exposure to hazardous vapors 93. Skin contacts with contaminated soil	5. Wear proper PPE (nitrile gloves, cut-resistant or leather gloves 6. Wear proper PPE (cut-resistant or leather gloves) 7. Do not place face over acetate liner when opening / Monitor hazardous vapors in air with PID / Upgrade PPE as necessary based on levels contained in the Health and Safety Plan 8. Wear proper PPE (nitrile gloves)
6. Remove excess soil from acetate liner and place in 55-gallon drum (IF NOT PERFORMED BY LANGAN, REMOVE!)	5. Cuts/lacerations from acetate liner 6. Pinched fingers/hand while opening/closing drum. 7. Skin contacts with contaminated soil 8. Soil debris in eyes	5. Wear proper PPE (cut-resistant or leather gloves) 6. Wear proper PPE (cut-resistant or leather gloves) 7. Wear proper PPE (nitrile gloves) 8. Wear proper PPE (safety glasses)
7. Attach hollow-stem augers to the GeoProbe rig; Advance augers and attach. additional augers until desired depth is reached	1. Strain wrist/bruise palm 2. Pinched fingers 3. Back Strain 4. Clothing entanglement 5. Carbon monoxide poisoning 6. Bruise toes/foot 7. High noise levels 8. Skin contacts with contaminated soil	1. Wear proper PPE (cut-resistant or leather gloves) 2. Wear proper PPE (cut-resistant or leather gloves) 3. Use proper lifting techniques. 4. Wear proper work attire(no loose clothing/strings) 5. Properly ventilate work area 6. Wear proper PPE (safety shoes) 7. Wear proper PPE (hearing protection) 8. Wear proper PPE (Tyvek sleeves, nitrile gloves)
8. Install monitoring well	1. Pinched fingers 2. Lacerations/abrasions 3. Back Strain	1. Wear proper PPE (cut-resistant or leather gloves) 2. Wear proper PPE (cut-resistant or leather gloves) 3. Use proper lifting techniques
9. Tremie-grout annulus space above bentonite seal	1. Back strain 2. Pinched fingers	1. Use proper lifting techniques. 2. Wear proper PPE (cut-resistant or leather gloves)
10. Install flush-mount monitoring well pad	1. Splashed concrete. 2. Pinched fingers 3. Cuts/lacerations	1. Wear proper PPE (safety glasses) 2. Wear proper PPE (cut-resistant or leather gloves) 3. Wear proper PPE (cut-resistant or leather gloves)
11. Decontaminate equipment	1. Splashing water/soap 2. Contact with potentially contaminated groundwater/soil through dermal exposure. 3. Electrical shock from broken electric cords	1. Wear proper PPE (safety glasses) 2. Wear proper PPE (safety glasses, dermal protection) 3. Properly plug in pump to generator / Do not allow the pump or generator to contact water / Check for breaks in the cord
12. Transport drums to central staging location (IF NOT PERFORMED BY LANGAN, REMOVE!)	7. Back, arm or shoulder strain from moving drums. 8. Pinch fingers/hand in drum cart when moving drums. 9. Pinch fingers/hand when operating lift-gate on vehicle. 10. Contact with potentially contaminated groundwater when moving improperly sealed drums. 11. Slips when moving drums. 12. Drop drum on feet/toes	101. Use drum cart for moving drums / Use proper lifting techniques / Do not lift heavy loads without assistance. 102. Wear proper PPE (cut-resistant or leather gloves) 103. Wear proper PPE (cut-resistant or leather gloves) 104. Wear proper PPE (nitrile gloves underneath work gloves) 105. Follow good housekeeping procedures / Ensure route to move drum and storage space is free from obstructions. 106. Wear proper PPE (safety shoes) / Work in a safe manner to prevent dropped drum

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
13. All activities 13. All activities (cont'd)	11. Slips/ Trips/ Falls 12. Hand injuries, cuts, or lacerations during manual handling of materials 13. Foot injuries 14. Back injuries 15. Traffic 16. Wildlife: Stray dogs, Mice/rats, Vectors (i.e., mosquitoes, bees, etc.) 17. High Noise levels 18. Overhead hazards 19. Heat Stress/ Cold Stress 20. Eye Injuries	11. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards. 12. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves. 13. Wear Langan approved safety shoes. 14. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible. 15. Wear high visibility clothing & vest / Use cones or signs to designate work area. 16. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed. 17. Wear hearing protection 18. Wear hard hat / Avoid areas where overhead hazards exist. 19. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress. 20. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Monitoring Well Development**
JSA Number: **JSA026-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last-Minute Risk Assessment.



PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☐ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☒ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☒ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Tyvek Sleeves				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
62. Transport equipment to work area	41. Back Strains 42. Slips/Trips/Falls 43. Traffic 44. Cuts/Abrasions/Contusions from equipment	31. Use proper lifting techniques/ Use wheeled transport/ use buddy system when lifting equipment. 32. Minimize distance from work area/ unobstructed path to collection points and vehicle/ Follow good housekeeping procedures. 33. Wear high-visibility vest or clothing/Exercise caution/ Use traffic cones or signage if needed. 34. Wear proper PPE (leather gloves, long sleeves, Langan approved safety shoes).
63. Measure depth of water	31. Exposure to hazardous substances 32. Pinched fingers	31. Wear proper PPE (Nitrile gloves, Safety glasses/Face shield). 32. Wear proper PPE (cut-resistant gloves).
64. Install Tremie pipe in the monitoring well and connect to water source.	16. Hand injuries during installation (pinched fingers/hands). 17. Back strain from holding Tremie pipe. 18. High pressure water spray.	10. Wear proper PPE (Nitrile gloves/cut-resistant gloves). 11. Use proper lifting techniques/ Use two personnel when lowering pump greater than 80 feet. 12. Ensure all those connections are tight and secure/ Use proper PPE (face shield and safety glasses).
65. Install pump in to well. a. Connect pump to sample tubing. b. Lower pump to desired depth in well. c. Connect sample tubing to flow cell. d. Connect pump to power source	18. Hand injuries during pump installation and sample tubing cutting. 19. Back strain 20. Electric shock 21. Exhaust gases from generator 22. Burns from hot equipment	14. Wear proper PPE when installing pump and cutting sample tubing (Nitrile and cut-resistant gloves)/ Use tubing cutter. 15. Proper lifting techniques/ Two personnel when installing pump at depths greater than 80 feet/ Use buddy when lifting heavy loads (pump, generator)/Use wheeled transport. 16. Ensure equipment is (LO/TO: locked out/tagged out) prior to preforming any electrical connections/ Inspect wires for frays or cuts/Ensure generator is properly grounded prior to starting.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
(generator) e. Turn on power source (generator)		17. Position generator so that exhaust is flowing away from work area. 18. Do not touch exhaust or any hot part of generator/ Allow equipment time to cool down prior to carrying/ Use proper PPE (long sleeves, leather gloves)
66. Develop monitoring well. a. Jet water into well using Tremie pipe. b. Turn pump on and adjust to desired flow rate. c. Surge pump up and down well to remove sediment from screen. d. Containerize all purge water from well.	94. Hand injuries 95. Face injuries 96. Contaminated spray from water	107. Wear proper PPE (cut-resistant gloves and nitrile gloves). 108. Wear proper PPE (face shield and safety glasses)/do not stand over well opening. 109. Wear proper PPE (Face shield and safety goggles)/Tyvek over garments/ Ensure all connections are secure and tight/ Tubing outlet is contained in an overflow container.
67. Drum staging area.	1. Back, Arm, and shoulder strain. 2. Pinch points 3. Cross contamination 4. Slip/Trips/Falls	1. Use proper lifting techniques/ Use drum carts when moving drums/ use buddy system for moving of drums if needed/Move drums shortest distance needed. 2. Keep fingers and feet away from pinch points/ Use proper PPE (cut-resistant gloves, Langan approved safety shoes) 3. Use proper PPE (Nitrile gloves, Tyvek sleeves) 4. Ensure pathway is clear prior to moving equipment/ Mark all hazards/ Use additional person as a spotter if needed.
68. Equipment pack-up	1. Back Strains 2. Slips/Trips/Falls 3. Traffic 4. Cuts/Abrasions/Contusions from equipment.	1. Use proper lifting techniques/ Use wheeled transport/ use buddy system when lifting equipment. 2. Minimize distance from work area/ Unobstructed path to collection points and vehicle/ Follow good housekeeping procedures. 3. Wear high-visibility vest or clothing/Exercise caution/ Use traffic cones or signage if needed. 110. Wear proper PPE (leather gloves, long sleeves, Langan approved safety shoes).
69. All activities	1. Slips/ Trips/ Falls 2. Hand injuries, cuts, or lacerations during manual handling of materials 3. Foot injuries 97. Back injuries 98. Traffic 99. Wildlife: Stray dogs, Mice/rats, Vectors (i.e., mosquitoes, bees, etc.) 100. High Noise levels 101. Overhead hazards 102. Heat Stress/ Cold Stress 103. Eye Injuries	1. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves 3. Wear Langan approved safety shoes 4. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 5. Wear high visibility clothing & vest / Use cones or signs to designate work area 6. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 7. Wear hearing protection 8. Wear hard hat / Avoid areas where overhead hazards exist. 9. Wear proper attire for weather conditions (sunscreen or protective clothing

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 10. Wear safety glasses.
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Groundwater/Product Purging/Sampling with Bailer**
JSA Number: **JSA053**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last-Minute Risk Assessment.



S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☒ Safety Goggles	☒ Face Shield	☒ Nitrile Gloves	☒ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☒ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Tyvek sleeves, Dermal Protection, PID, absorbent pads				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
70. Transport equipment to work area	6. Back Strain 7. Slips/ Trips/ Falls 8. Traffic 9. Cuts/abrasions from equipment 10. Contusions from dropped equipment	6. Use proper lifting techniques / Use wheeled transport. 7. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures. 8. Wear proper PPE (high visibility vest or clothing) 9. Wear proper PPE (leather gloves, long sleeves) 10. Wear proper PPE (safety shoes)
71. Remove well cover	33. Scrape knuckles/hand 34. Strain wrist/bruise plan 35. Pinch fingers or hand	6. Wear proper PPE (leather gloves) 7. Using a hammer, tap the end of the wrench to loosen grip of bolts. 8. Wear proper PPE (leather gloves)
72. Remove well cap and lock	19. Well can pops from pressure. 20. Exposure to hazardous substances through inhalation or dermal exposure 21. Scrape knuckles/hand 22. Pinch points 23. Strain write/bruise palm	9. Remove cap slowly to relieve pressure / Do not place face over well when opening / Wear proper PPE (safety glasses, face shield, hand protection) 10. Use direct air monitoring/reading instrument (i.e., PID) / Be familiar with and follow actions prescribed in the HASP / Wear proper PPE (nitrile gloves) 11. Wear proper PPE (leather gloves) 12. Using hammer, tap the end of the wrench to loosen grip
73. Measure head-space vapor levels	2. Exposure to hazardous substances through inhalation	2. Do not place face over well when collecting measurement
74. Set-up plastic sheeting/absorbent pads	2. Lacerations when cutting plastic sheeting/absorbent pads.	2. Use scissors to cut plastic sheeting/absorbent pads / Cut motions should always be away from body and body parts

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
for work site around the well		
75. Lower Bailer sleeve into well	7. Repetitive motion injury (pulled arm/back muscles) 8. Dehydration	7. Take breaks while lowering bailer into well/ Use a mechanical device to lower bailer into well/ Rotate employees (take turns conducting the manual labor portion) 8. Take breaks and drink water.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
7. Purge/Sample water/product collection	1. Contact with potentially contaminated groundwater or product through dermal exposure 2. Contact with and burns from acid used for sample preservation 9. Tripping potential on sampling lanyard 10. Lacerations from broken sample bottles 11. Back strain when transporting coolers full of collected samples. 12. Slips/ Trips/ Falls	1. Wear proper PPE (safety glasses, nitrile gloves, safety shield, Tyvek) 2. Ensure sample bottle lids are secure before use and after sample collection 3. Organize lanyard to keep out of the way as much as possible / Mark potential tripping hazards with caution tape or safety cones 9. Do not over-tighten bottle caps / Handle bottles safely to prevent breakage / Wrap glass bottles in bubble wrap, if possible 10. Use proper lifting techniques / Use wheeled transport / Seek assistance if coolers weight exceeds 50lbs. / Minimize distance to vehicle. 11. Have unobstructed path to vehicle or collection point / Follow good housekeeping procedures / Do not lift/walk with coolers that are too heavy/difficult to lift
8. Retrieval of bailer	9. Repetitive motion injury (pulled arm/back muscles) 10. Dehydration	9. Take breaks while retrieving bailer out of the well/ Use a mechanical device to raise bailer out of well/ Rotate employees (take turns conducting the manual labor portion) 10. Take breaks and drink water.
9. Pack-up equipment	2. Back strain when removing or lifting heavy equipment	2. Use proper lifting technique / Use wheeled transport for heavy equipment
10. Replace well cap and lock	3. Scrape fingers/hand 4. Strain wrist/bruise palm	3. Wear proper PPE (leather gloves) 4. Using hammer, tap the end of the well cap to tighten grip
11. Replace well cover	4. Scrape knuckles/hand 5. Strain write/bruise palm. 6. Pinch fingers or hand	4. Wear proper PPE (leather gloves) 5. Using hammer, tap the end of the wrench to tighten the grip of the bolts. 6. Wear proper PPE (leather gloves)
12. Place used PPE in designated disposal drum	3. Pressure build-up inside drum 4. Pinch hazard	3. Remove cap from bung hole in drum to relieve pressure. 4. Wear proper PPE (leather gloves) 5. Product drums may require additional spill protection/electrical grounding, check local regulations
13. Decontaminate equipment	4. Splashing water/soap from decontamination 5. Contact with potentially contaminated groundwater through dermal exposure.	4. Wear proper PPE (safety glasses) 5. Wear proper PPE (safety glasses, dermal protection)

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
14. All activities	104. Slips/ Trips/ Falls 105. Hand injuries, cuts, or lacerations during manual handling of materials 106. Foot injuries 107. Back injuries 108. Traffic 109. Wildlife: Stray dogs, Mice/rats, Vectors (i.e., mosquitoes, bees, etc.) 110. High Noise levels 111. Overhead hazards 112. Heat Stress/ Cold Stress 113. Eye Injuries	111. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards. 112. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves. 113. Wear Langan approved safety shoes. 114. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible. 115. Wear high visibility clothing & vest / Use cones or signs to designate work area. 116. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed. 117. Wear hearing protection 118. Wear hard hat / Avoid areas where overhead hazards exist. 119. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress. 120. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: Hammer Drill
JSA Number: JSA049

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last-Minute Risk Assessment.



S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☒ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
76.Transport equipment to work area	45.Back Strain 46.Slips/ Trips/ Falls 47.Traffic 48.Cuts/abrasions from equipment 49.Contusions from dropped equipment	11. Use proper lifting techniques / Use wheeled transport. 12. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures. 13. Wear proper PPE (high visibility vest or clothing) 14. Wear proper PPE (leather gloves, long sleeves) 15. Wear proper PPE (safety shoes)
77.Electrical Connection	36.Inspect electrical cord to drill. 37.Inspect hammer drill. 38.Inspect extension cord. 39.Test GFCI	9. Check the plug, ensure all connections are in place, check cord for frayed sections. If plug or cord are worn, do not use equipment until repaired. 10. Inspect chuck for proper grasping and holding of bit, check that plastic housing is not cracked or missing pieces. Do not use if chuck does not work properly or housing is compromised. 11. Inspect extension cord, if worn or stripped pull from service and replace 12. Test GFCI, replace if GFCI fails
78.Drill Bit	1. Inspect drill bit	1. Replace if worn. 2. Wear proper PPE (leather gloves) when installing and removing drill bit. 3. Ensure equipment is unplugged from electrical power when removing and installing drill bit.
79.Use of Hammer Drill	1. Hazards associated with using hammer drill, flying objects, heavy equipment, ground level hazards and dust. 2. Slips/ Trips/ Falls 3. Hazards associated drilling into concrete slab	1. Maintain a safe distance from other site operations / Wear proper PPE (hard hat, safety glasses, safety shoes, safety vest, ear protection and leather gloves) 2. Be aware of potential trip hazards / Follow good housekeeping procedures / Mark extension cord pathway with safety cones. 3. Do not push hammer drill during use.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
80. All activities 4. All activities (cont'd)	114. Slips/ Trips/ Falls 115. Hand injuries, cuts, or lacerations during manual handling of materials 116. Foot injuries 117. Back injuries 118. Traffic 119. Wildlife: Stray dogs, Mice/rats, Vectors (i.e., mosquitoes, bees, etc.) 120. High Noise levels 121. Overhead hazards 122. Heat Stress/ Cold Stress 123. Eye Injuries	121. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards. 122. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves. 123. Wear Langan approved safety shoes. 124. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible. 125. Wear high visibility clothing & vest / Use cones or signs to designate work area. 126. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed. 127. Wear hearing protection 128. Wear hard hat / Avoid areas where overhead hazards exist. 129. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress. 130. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	**Sign Name**	**Date**
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Test Pits**
JSA Number: **JSA016-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last-Minute Risk Assessment.



S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☐ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
81. Transport equipment to work area	50. Back Strain 51. Slips/ Trips/ Falls 52. Traffic 53. Cuts/abrasions from equipment 54. Contusions from dropped equipment	16. Use proper lifting techniques / Use wheeled transport 17. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 18. Wear proper PPE (high visibility vest or clothing) 19. Wear proper PPE (leather gloves, long sleeves) 20. Wear proper PPE (safety shoes)
82. Digging Test Pit	40. Back Strain 41. Unstable walls of excavation	13. Observe proper digging technique. Ensure spoil pile and equipment are at least 2 feet from edge of excavation. 14. Excavate test pit in a stepped manor.
83. All activities	124. Slips/ Trips/ Falls 125. Hand injuries, cuts, or lacerations during manual handling of materials 126. Foot injuries 127. Back injuries 128. Traffic 129. Wildlife: Stray dogs, Mice/rats, Vectors (i.e., mosquitoes, bees, etc.) 130. High Noise levels 131. Overhead hazards 132. Heat Stress/ Cold Stress 133. Eye Injuries	131. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 132. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 133. Wear Langan approved safety shoes 134. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 135. Wear high visibility clothing & vest / Use cones or signs to designate work area

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
3. All activities (cont'd)		136. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed. 137. Wear hearing protection 138. Wear hard hat / Avoid areas where overhead hazards exist. 139. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress. 140. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	**Sign Name**	**Date**
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: Hand Auger Soil Sampling
JSA Number: JSA003-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last-Minute Risk Assessment.



S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task / **Stop** & regroup*

PERSONAL PROTECTIVE EQUIPMENT REQUIRED:				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Half-face respirator, dust cartridges, PID (if applicable)				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
84. Unpack equipment	55. Slips/ Trips/ Falls 56. Physical hazards including strains and hand injury	1. Be aware of hazards in area/ Place safety cones in areas of potential slips/trips/falls 2. Use proper lifting techniques / Do not lift heavy loads without assitance / Avoid putting hands near pinch points / Wear proper PPE (leather gloves)
85. Calibration of monitoring equipment	42. Skin or eye contact with calibration chemicals 43. Pinch fingers in monitoring equipment	33. Wear proper PPE (safety glasses/ goggles) 34. Wear proper PPE (leather gloves)
86. Advancing and removing hand auger	24. Physical hazards including back strain and hand injury	13. Twist auger using arms and shoulders/ Do not over exert / Keep back in neutral position, bend at the knees / Request assistance when needed / Remove auger from ground keeping back in neutral position and lift using legs
87. Sample collections a) Monitor parameters b) Prepare sample containers and labels c) Collect soil sample d) Securely cap containers, label and store in sample cooler until shipping e) Deliver cooler to lab or courier to lab	23. Contact with potentially contaminated soil 24. Lacerations from broken sample bottles 25. Back strain with transporting coolers 26. Internal exposure to contaminants through inhalation of dust 27. Slips/ Trips/ Falls	19. Use monitoring devices / Wear proper PPE (safety glasses, nitrile gloves) 20. Do not over-tighten bottles caps / Handle bottles safety to prevent breakage 21. Use proper lifting techniques / Do not lift heavy loads without assistance 22. Avoid creating dust / If necessary, wear a half-face respirator with applicable dust cartridges / Inspect respirator for damage and cleanliness prior to use / Clean respirator after each use and store in a clean, secure location 23. Be alert / Follow good housekeeping procedures
88. Decontamination of equipment	134. Splashing water/soap from decontamination 135. Contact with potentially contaminated soil	141. Wear proper PPE (safety glasses, gloves) 142. Wear proper PPE (safety glasses, gloves)

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
89. All activities 6. All activities (cont'd)	1. Slips/ Trips/ Falls 2. Hand injuries, cuts or lacerations during manual handling of materials 3. Foot injuries 4. Back injuries 5. Traffic 6. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 7. High Noise levels 8. Overhead hazards 9. Heat Stress/ Cold Stress 10. Eye Injuries	1. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 3. Wear Langan approved safety shoes 4. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 5. Wear high visibility clothing & vest / Use cones or signs to designate work area 6. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 7. Wear hearing protection 8. Wear hard hat / Avoid areas were overhead hazards exist. 9. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 10. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Groundwater/Product Purgeing/Sampling with Bailer**
JSA Number: **JSA053**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.



S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☒ Safety Goggles	☒ Face Shield	☒ Nitrile Gloves	☒ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☒ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Tyvek sleeves, Dermal Protection, PID, absorbent pads				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
90. Transport equipment to work area	11. Back Strain 12. Slips/ Trips/ Falls 13. Traffic 14. Cuts/abrasions from equipment 15. Contusions from dropped equipment	11. Use proper lifting techniuqes / Use wheeled transport 12. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 13. Wear proper PPE (high visibility vest or clothing) 14. Wear proper PPE (leather gloves, long sleeves) 15. Wear proper PPE (safety shoes)
91. Remove well cover	44. Scrape knuckles/hand 45. Strain wrist/bruise plam 46. Pinch fingers or hand	15. Wear proper PPE (leather gloves) 16. Using a hammer, tap the end of the wrench to loosen grip of bolts 17. Wear proper PPE (leather gloves)
92. Remove well cap and lock	25. Well can pops from pressure 26. Exposure to hazardous substances through inhalation or dermal exposure 27. Scrape knuckles/hand 28. Pinch points 29. Strain write/bruise palm	13. Remove cap slowly to relieve pressure / Do not place face over well when opening / Wear proper PPE (safety glasses, face shield, hand protection) 14. Use direct air monitoring/reading instrument (i.e. PID) / Be familiar with and follow actions prescribed in the HASP / Wear proper PPE (nitrile gloves) 15. Wear proper PPE (leather gloves) 16. Using hammer, tap the end of the wrench to loosen grip
93. Measure head-space vapor levels	3. Exposure to hazardous substances through inhalation	3. Do not place face over well when collecting measurement
94. Set-up plastic sheeting/absorbent pads for work site around the well	3. Lacerations when cutting plastic sheeting/absorbent pads	3. Use scissors to cut plastic sheeting/absorbent pads / Cut motions should always be away from body and body parts

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
95. Lower Bailer sleeve into well	12. Repetitive motion injury (pulled arm/back muscles) 13. Dehydration	13. Take breaks while lowering bailer into well/ Use a mechanical device to lower bailer into well/ Rotate employees (take turns conducting the manual labor portion) 14. Take breaks and drink water.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
7. Purge/Sample water/product collection	1. Contact with potentially contaminated groundwater or product through dermal exposure 2. Contact with and burns from acid used for sample preservation 15. Tripping potential on sampling lanyard 16. Lacerations from broken sample bottles 17. Back strain when transporting coolers full of collected samples 18. Slips/ Trips/ Falls	1. Wear proper PPE (safety glasses, nitrile gloves, safety shield, Tyvek) 2. Ensure sample bottle lids are secure before use and after sample collection 3. Organize lanyard to keep out of the way as much as possible / Mark potential tripping hazards with caution tape or safety cones 14. Do not over-tighten bottle caps / Handle bottles safely to prevent breakage / Wrap glass bottles in bubble wrap, if possible 15. Use proper lifting techniques / Use wheeled transport / Seek assistance if coolers weight exceeds 50lbs. / Minimize distance to vehicle 16. Have unobstructed path to vehicle or collection point / Follow good housekeeping procedures / Do not lift/walk with coolers that are too heavy/difficult to lift
8. Retieval of bailer	11. Repetitive motion injury (pulled arm/back muscles) 12. Dehydration	11. Take breaks while retrieving bailer out of the well/ Use a mechanical device to raise bailer out of well/ Rotate employees (take turns conducting the manual labor portion) 12. Take breaks and drink water.
9. Pack-up equipment	3. Back strain when removing or lifting heavy equipment	3. Use proper lifting technique / Use wheeled transport for heavy equipment
10. Replace well cap and lock	5. Scrape fingers/hand 6. Strain wrist/bruise palm	5. Wear proper PPE (leather gloves) 6. Using hammer, tap the end of the well cap to tighten grip
11. Replace well cover	7. Scrape knuckles/hand 8. Strain write/bruise palm 9. Pinch fingers or hand	7. Wear proper PPE (leather gloves) 8. Using hammer, tap the end of the wrench to tighten the grip of the bolts 9. Wear proper PPE (leather gloves)
12. Place used PPE in designated dispoal drum	5. Pressure build-up inside drum 6. Pinch hazard	6. Remove cap from bung hole in drum to relieve pressure 7. Wear proper PPE (leather gloves) 8. Product drums may require additional spill protecton/electrical grounding, check local regulations
13. Decontaminate equipment	6. Splashing water/soap from decontamination 7. Contact with potentially contaminated groundwater through dermal exposure	6. Wear proper PPE (safety glasses) 7. Wear proper PPE (safety glasses, dermal protection)

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
14. All activities	136. Slips/ Trips/ Falls 137. Hand injuries, cuts or lacerations during manual handling of materials 138. Foot injuries 139. Back injuries 140. Traffic 141. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 142. High Noise levels 143. Overhead hazards 144. Heat Stress/ Cold Stress 145. Eye Injuries	143. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 144. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 145. Wear Langan approved safety shoes 146. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 147. Wear high visibility clothing & vest / Use cones or signs to designate work area 148. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 149. Wear hearing protection 150. Wear hard hat / Avoid areas were overhead hazards exist. 151. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 152. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Sub-slab soil gas temporary point installation and sampling**
JSA Number: **JSA037-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.



S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☐ Hearing Protection
☒ Safety Glasses	☒ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☒ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Tyvek Sleeves				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
96. Transport equipment to work site	57. Back injuries 58. Slips/Trips/Falls 59. Traffic 60. Hand injuries	35. Use proper lifting techniques/ Use wheeled transport/ Get assistance when need with moving equipment/ Minimize distance from vehicle 36. Minimize distance from vehicle/ Have unobstructed pathway to vehicle and collection points/ Mark tripping hazards with spray paint, cones, or caution tape/ Observe good housekeeping procedures. 37. Wear proper PPE (High Visibility vest and clothing)/ Exercise caution (stay alert-stay alive) 38. Wear proper PPE (leather gloves)/ Keep finger and hands clear of pinch points.
97. Mark area for drilling	47. Slips/Trips/Falls	35. Minimize distance from vehicle/ Have unobstructed pathway to vehicle and collection points/ Mark tripping hazards with spray paint, cones, or caution tape/ Observe good housekeeping procedures
98. Drill sampling points with hammer drill	30. Eye injuries 31. Dust exposure 32. Hand injuries 33. Catch items (clothing) 34. Electric shock 35. Chemical atmosphere hazard (vapor) 36. Slips/Trips/Falls	14. Wear proper PPE (safety glasses) 15. Wear proper PPE (dust mask) 16. Wear proper PPE (leather gloves)/ Keep hands and fingers out of pinch points/ Avoid drill catching on ground and twisting wrist or hand/ Release drill grip if drill becomes caught/ Ensure drill is unplugged prior to inserting bit. 17. Tie up or tuck-in all loose clothing/ Maintain distance from drill 18. Inspect power cable for cuts or nicks before use/ Use GFCI outlet on power cord/ Do not use in wet conditions 19. Monitor air, vapors with Photo-ionization detector (PID)

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		20. Minimize distance from vehicle/ Have unobstructed pathway to vehicle and collection points/ Mark tripping hazards with spray paint, cones, or caution tape/ Observe good housekeeping procedures
99. Measure vapor content and depth to bottom of hole	1. Chemical atmosphere hazard (vapors)	1. Monitor air, vapors with Photo-ionization detector (PID)/ Keep face away from opening of hole while collecting measurements
100. Set-up of shroud and sampling canister system	1. Hand injuries 2. Chemical atmosphere hazard (vapors) 3. Slips/Trips/Falls	1. Wear proper PPE (leather gloves, nitrile gloves)/ Keep fingers away from pinch points when installing pump/ Do not use open blades, use tubing cutter 2. Monitor air, vapors with Photo-ionization detector (PID)/ Keep face away from opening of hole while collecting measurements 3. Minimize distance from vehicle/ Have unobstructed pathway to vehicle and collection points/ Mark tripping hazards with spray paint, cones, or caution tape/ Observe good housekeeping procedures
101. Purge soil gas	1. Chemical atmosphere hazard (vapors)	1. Monitor air, vapors with Photo-ionization detector (PID)/ Keep face away from exhaust port of pump
102. Sample collection (opening and closing valves)	1. Hand injuries	1. Wear proper PPE (leather gloves)/ Keep fingers away from pinch points
103. Sealing sampling holes	1. Back injuries 2. Concrete dust 3. Eye injuries	1. Use proper lifting techniques for lifting of cement bags 2. Wear proper PPE (dust mask) 3. Wear proper PPE (safety glasses)
104. All activities	146. Slips/ Trips/ Falls 147. Hand injuries, cuts or lacerations during manual handling of materials 148. Foot injuries 149. Back injuries 150. Traffic 151. Wildlife: Stray animals, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 152. High Noise levels 153. Overhead hazards 154. Heat or cold injuries 155. Eye Injuries	153. Be aware of potential trip hazards/ Follow good housekeeping procedures/ Mark significant hazards 154. Inspect for jagged/sharp edges, and rough or slippery surfaces/ Keep fingers away from pinch points/ Wipe off greasy, wet, slippery or dirty objects before handling/ Wear leather/ cut-resistant gloves Wear proper PPE (Langan approved safety shoes) 155. Use proper lifting techniques/ Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift/ Obtain assistance when possible 156. Wear high visibility clothing & vest/ Use cones or signs to designate work area 157. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray animals/ Carry and use animal repellant when needed/ Use bug spray when needed 158. Wear hearing protection 159. Wear hard hat/ Avoid areas were overhead hazards exist. 160. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather)/ Drink plenty of fluids to avoid dehydration/ Takes breaks as necessary to avoid heat/cold stress 161. Wear safety glasses

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: Indoor Air Sampling
JSA Number: JSA007-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.



S – *Stop,* what has changed?
T – *Think* about the task
E – *Evaluate* potential hazards
P – *Plan* safe approach
S - *Start* task / *Stop* & regroup

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: PID, Respiratory Protection (if necessary)				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
105. Building walkthrough and background contaminant removal	61. Slips / Trips/ Falls 62. Exposure to substances/vapors during removal	21. Be aware of potential trip hazards / Follow good housekeeping procedures / Mark significant below-grade hazards (i.e. holes, trenches) with safety cones or spray paint 22. Monitor indoor air concentrations with a PID / Wear proper PPE (nitrile gloves) / Wear proper respiratory protection if necessary
106. Transport equipment to work area	16. Back Strain 17. Slips/ Trips/ Falls 18. Traffic 19. Cuts/abrasions from equipment 20. Contusions from dropped equipment	16. Use proper lifting techniques / Use wheeled transport 17. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 18. Wear proper PPE (high visibility vest or clothing) 19. Wear proper PPE (leather gloves, long sleeves) 20. Wear proper PPE (safety shoes)
107. Mark out areas for indoor air sampling	48. Slips/ Trips/ Falls	18. Be aware of potential trip hazards / Follow good housekeeping procedures / Mark significant below-grade hazards (i.e. holes, trenches) with safety cones or spray paint
108. Set-up canisters and begin indoor air sampling	37. Dropping crates or canisters 38. Pinch hazard	17. Exercise caution when moving crates and canisters / Use proper housekeeping of materials during sample events / Do not carry too many items at one time / Perform several trips, if necessary 18. Wear proper PPE (leather gloves)
109. Sample collection	4. Dropping crates or canisters 5. Pinched fingers from opening valves	4. Exercise caution when moving crates and canisters / Use proper housekeeping of materials during sample events / Do not carry too many items at one time / Perform several trips, if necessary 5. Wear proper PPE (leather gloves) / Keep fingers away from pinch points
110. Pack up equipment	3. Back strain	3. Use proper lifting techniques / Use wheeled transport

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
	4. Slips/ Trips/ Falls 5. Traffic	4. Be aware of potential trip hazards / Follow good housekeeping procedures / Minimize distance to vehicle 5. Wear proper PPE (safety vest)
111. All activities	156. Slips/ Trips/ Falls 157. Hand injuries, cuts or lacerations during manual handling of materials 158. Foot injuries 159. Back injuries 160. Traffic 161. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 162. High Noise levels 163. Overhead hazards 164. Heat Stress/ Cold Stress 165. Eye Injuries	162. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 163. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 164. Wear Langan approved safety shoes 165. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 166. Wear high visibility clothing & vest / Use cones or signs to designate work area 167. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 168. Wear hearing protection 169. Wear hard hat / Avoid areas were overhead hazards exist. 170. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 171. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: Geotechnical Drilling
JSA Number: JSA014-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last-Minute Risk Assessment.



PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☒ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: NomeX (as needed)				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
112. Transport equipment to work area	63. Back Strain 64. Slips/ Trips/ Falls 65. Traffic 66. Cuts/abrasions from equipment 67. Contusions from dropped equipment	23. Use proper lifting techniques / Use wheeled transport. 24. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures. 25. Wear proper PPE (high visibility vest or clothing) 26. Wear proper PPE (leather gloves, long sleeves) 27. Wear proper PPE (safety shoes)
113. Set-up HSA/SPT rig	49. Slips/ Trips/ Falls 50. Pinch Hazards 51. High noise levels 52. Clothing entanglement 53. Electrocution/falling equipment and debris from raising HSA/SPT rig mast. 54. Carbon monoxide poisoning 55. HSA/SPT rig roll-over 56. HSA/SPT rig movement	19. Be aware of potential trip hazards / Follow good housekeeping procedures / Mark significant below-grade hazards (i.e., holes, trenches) with safety cones or spray paint 20. Wear proper PPE (leather gloves) 21. Wear proper PPE (hearing protection) 22. Wear proper attire for HSA/SPT rig (no loose clothing, strings, etc.) 23. Wear proper PPE (hard hats) / Be aware of locations at all times / Look up, down and around before raising mast / Check HSA/SPT drill rig mast for loose objects/debris before raising 24. Stand upwind of rig engine 25. Do not move rig with mast raised / Set stabilizers prior to raising mast / Inspect work area / If area appears unstable, the boring locations should be moved. 26. All field personnel should stay clear of rig while moving / Use a spotter when backing up the rig
114. Advance HSA/SPT rods, augers, and casing below ground surface	39. Strain wrist/bruise palm 40. Pinched fingers 41. Back strain	19. Wear proper PPE (leather gloves) / Use proper technique for preparing rods / Use second person, if necessary 20. Wear proper PPE (leather gloves)

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
115. Advance HSA/SPT rods, augers, and casing below ground surface (cont'd)	42. Clothing entanglement 43. Carbon monoxide poisoning 44. Bruised/Broken toes/feet 45. High noise levels	21. Use proper lifting techniques / Obtain assistance if needed 22. Wear proper attire for HSA/SPT rig (no loose clothing, strings, etc.) 23. Stand upwind of the rig 24. Wear proper PPE (safety shoes) 25. Wear proper PPE (hearing protection)
116. Remove and open split spoon	28. Pinched fingers 29. Cuts/lacerations 30. Skin contact with contaminated soil and groundwater	1. Wear proper PPE (nitrile and leather gloves) 2. Wear proper PPE (leather gloves) 3. Wear proper PPE (nitrile gloves, safety glasses)
117. Repeat steps 3 and 4 until desired depth is reached	5. See steps 3 and 4	1. See steps 3 and 4
118. Remove HSA/SPT rods, augers and casing and place in storage rack	1. Clothing entanglement 2. Back strain 3. Pinched fingers 4. Carbon monoxide poisoning 5. High noise levels	1. Wear proper attire for HSA/SPT rig (no loose clothing, strings, etc.) 2. Use proper lifting techniques / Obtain assistance if needed 3. Wear proper PPE (leather gloves) 4. Stand upwind of rig engine 5. Wear proper PPE (hearing protection)
119. Tremie-grout borehole with a cement-bentonite grout mixture	1. Splash cement/bentonite grout on face/eyes 2. Back strain 3. Pinched fingers	1. Wear proper PPE (safety glasses) 2. Use proper lifting techniques / Obtain assistance if needed 3. Wear proper PPE (nitrile gloves, leather gloves)
120. Decontaminate equipment	1. Contact with potentially impacted material 2. Contact with sharp pieces of equipment	1. Wear proper PPE (safety glasses, nitrile gloves) 2. Wear proper PPE (leather gloves)
121. Patch soil boring location to return to pre-existing conditions (i.e. concrete, asphalt, grass)	1. Cuts/lacerations 2. Splashed concrete on face/eyes 3. Hammer fingers/hands when patching asphalt	1. Wear proper PPE (leather gloves) / Use scissors for cutting 2. Use proper PPE (safety glasses) 3. Be aware of hands/fingers during hammering / Wear proper PPE (leather gloves)
122. All activities	166. Slips/ Trips/ Falls 167. Hand injuries, cuts, or lacerations during manual handling of materials 168. Foot injuries 169. Back injuries 170. Traffic 171. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 172. High Noise levels 173. Overhead hazards 174. Heat Stress/ Cold Stress 175. Eye Injuries	172. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 173. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 174. Wear Langan approved safety shoes 175. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 176. Wear high visibility clothing & vest / Use cones or signs to designate work area 177. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 178. Wear hearing protection 179. Wear hard hat / Avoid areas were overhead hazards exist.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		180. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 181. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Test Pits**
JSA Number: **JSA016-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.



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E – *Evaluate* potential hazards
P – *Plan* safe approach
S - *Start* task / *Stop* & regroup

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☐ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
123. Transport equipment to work area	68. Back Strain 69. Slips/ Trips/ Falls 70. Traffic 71. Cuts/abrasions from equipment 72. Contusions from dropped equipment	28. Use proper lifting techniques / Use wheeled transport 29. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 30. Wear proper PPE (high visibility vest or clothing) 31. Wear proper PPE (leather gloves, long sleeves) 32. Wear proper PPE (safety shoes)
124. Digging Test Pit	57. Back Strain 58. Unstable walls of excavation	27. Observe proper digging technique. Ensure spoil pile and equipment are at least 2 feet from edge of excavation. 28. Excavate test pit in a stepped manor.
125. All activities	176. Slips/ Trips/ Falls 177. Hand injuries, cuts, or lacerations during manual handling of materials 178. Foot injuries 179. Back injuries 180. Traffic 181. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 182. High Noise levels 183. Overhead hazards 184. Heat Stress/ Cold Stress 185. Eye Injuries	182. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 183. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 184. Wear Langan approved safety shoes 185. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 186. Wear high visibility clothing & vest / Use cones or signs to designate work area 187. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
3. All activities (cont'd)		188. Wear hearing protection 189. Wear hard hat / Avoid areas where overhead hazards exist. 190. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress. 191. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

ATTACHMENT H

TAILGATE SAFETY BRIEFING FORM

LANGAN TAILGATE SAFETY BRIEFING

Date:_____ Time: _____

Leader:_____ Location:_____

Work Task:

_____

_____

SAFETY TOPICS (*provide some detail of discussion points*)

Chemical Exposure Hazards and Control:_____

_____

Physical Hazards and Control: _____

Air Monitoring: _____

PPE: _____

_____

Communications:_____

Safe Work Practices: _____

_____

Emergency Response: _____

Hospital/Medical Center Location: _____

Phone Nos.: _____

Other: _____

FOR FOLLOW-UP (the issues, responsibilities, due dates, etc.**)**

_____

_____

_____

ATTENDEES

PRINT NAME	COMPANY	SIGNATURE

APPENDIX K

FIELD SAMPLING PLAN

FIELD SAMPLING PLAN

for

1709 Surf Avenue
Brooklyn, New York
BCP Site No. C224398

Prepared For:

Coney Island Associates Phase 3 LLC
c/o BFC Partners
150 Myrtle Avenue, Suite 2
Brooklyn, New York

Prepared By:

Langan Engineering, Environmental, Surveying
Landscape Architecture and Geology, D.P.C.
368 Ninth Avenue, 8th Floor
New York, New York 10001

July 2025
Langan Project No. 170747001

LANGAN

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1.0 INTRODUCTION

Coney Island Associates Phase 3 LLC (the "Volunteers") executed a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) on June 1, 2024 to investigate and remediate an approximately 65,800-square-foot (1.511 acres) property located at 1709 Surf Avenue (Borough of Brooklyn Tax Block 7061, Lots 16, 20, 21, 27 and a portion of Lot 14) in the Coney Island neighborhood of Brooklyn, New York ("the site"). The site is enrolled in the New York State Brownfield Cleanup Program (BCP) as Site No. C224398.

Block 7061 is bound by Mermaid Avenue to the north, West 17th Street to the east, Surf Avenue to the south, and West 19th Street to the west.

The site has been in a densely developed urban area characterized by commercial, residential, and institutional uses since at least 1895. Residential, institutional, and commercial uses that occupied the site include a railroad (1895 to 1950) on Lot 14; a hotel (1895) on Lots 16, 20 and 21; a school (1906) on Lot 16; an unspecified store (1906 to 1950) and a drycleaner (1965 to 2007) on Lot 20; unspecified stores on Lot 21 (1906 to 1989); and a gasoline filling station with petroleum bulk storage, auto service station (1968 to 2003) and a car wash (1991 to 2003) on Lot 27. Between 1994 and 2007, the buildings on Lots 16, 20, 21, and 27 were vacated and all structures were razed. By 2009, all lots had been paved for use as a parking lot. Lot 16 was subsequently re-developed with a one-story community health center in 2015. Lots 14, 20, 21, and 27 continued to be used for parking and construction equipment storage. Lot 27 was historically used as a filling station and auto repair facility. This lot is associated with NYSDEC Spill No. 0302857, which was reported on June 17, 2003, after petroleum impacts were identified in soil and groundwater during the excavation and removal of twenty underground storage tanks (UST) associated with the former gasoline filling station. These USTs are registered under NYSDEC Petroleum Bulk Storage (PBS) No. 2-350486 and were removed on June 1, 2003. Impacted soil and free product were removed during tank removal.

Site redevelopment includes construction of a 12-story mixed-use commercial and residential building. The ground floor will be comprised of retail spaces, a lobby, a community facility, and utility and amenity rooms. Floors 1 through 12 will contain residential units. The central and northern parts of the site will be developed with open air parking at grade level. Additional information regarding the remedy implemented at the site is provided in the August 2025 draft Site Management Plan (SMP).

This Field Sampling Plan (FSP) defines the methods and procedures for conducting sampling during site management and related work.

1.1 OVERVIEW OF FIELD SAMPLING ACTIVITIES

The field sampling program will include the following:

- Indoor air and vapor samples will be collected from on-site vacuum monitoring points (VMPs) prior to occupancy, to determine if vapor mitigation measures will be necessary.

- Groundwater samples will be collected from on-site groundwater monitoring wells quarterly for the first year of the SMP.

2.0 GENERAL FIELD GUIDELINES

2.1 SITE HAZARDS AND UNDERGROUND UTILITIES

Potential on-site surface hazards, such as sharp objects, overhead power lines, energized areas, and other building hazards, will be identified prior to initiation of fieldwork. Additionally, prior to the onset of future ground intrusive work, the New York City One-Call Center will be contacted for a Code 753 utility mark-out, if necessary.

2.2 FIELD LOGBOOKS

All field activities will be documented in field logbooks. Entries will be of sufficient detail and will include a complete daily record of significant events, observations, and measurements. The field logbook will provide a legal record of the activities conducted at the site. Please refer to Langan's Standard Operating Procedure (SOP) No. 2 for detailed information regarding field books. Accordingly:

- Field books will be assigned a unique identification number, and bound with consecutively numbered pages.

- Field books will be controlled by the Field Team Leader while fieldwork is in progress.

- Entries will be written with waterproof ink, and signed and dated at the conclusion of each day of fieldwork.

- Erroneous entries made while fieldwork is in progress will be corrected by the person that made the entries. Corrections will be made by drawing a line through the error, entering the correct information, and initialing the correction.

- Corrections made after departing the field will be made by the person who made the original entries. Corrections will be made by drawing a line through the error, entering the correct information, and initialing and dating the time of the correction.

At a minimum, daily field book entries will include the following information:

- Location of field activity
- Date and time of entry
- Names and titles of field team members
- Names and titles of any site visitors and site contacts
- Weather information (i.e., temperature, cloud coverage, wind speed and direction)
- Purpose of field activity
- A detailed description of the field work conducted
- Sample media (soil vapor)
- Sample collection method
- Number and volume of samples taken
- Analytical parameters
- Date and time of collection
- Sample identification numbers
- Sample distribution (e.g., laboratory)
- Field observations
- Any field measurements collected (e.g., pH, temperature, conductivity, water level)
- References to all maps and photographs of the sampling sites
- Information pertaining to sample documentation such as:
    - Dates and method of sample shipments
    - Chain-of-Custody record and if shipped, tracking numbers

3.0 FIELD EQUIPMENT DECONTAMINATION AND MANAGEMENT OF INVESTIGATION DERIVED WASTES

3.1 MANAGEMENT OF DERIVED WASTES

- All personal protective equipment (PPE) and disposable sampling equipment will be disposed of as solid municipal waste, unless impacted by petroleum contamination, at which point, PPE will be placed in 55-gallon drums or roll-off containers for disposal in accordance with applicable local, state, and federal regulations.

4.0 SAMPLING PROCEDURES

4.1 INDOOR AIR SAMPLING

The following sampling equipment and methods will be used for groundwater sampling.

- Field book
- Project plans
- PPE in accordance with the HASP
- Photoionization detector (PID)
- Camera
- Laboratory-supplied sample vacuum canisters and flow controllers
- Shipping supplies (as necessary)

Sample Collection

A PID will be used to screen ambient air throughout the area where samples are to be collected. Air samples will be collected at breathing height (about 3 to 4 feet above grade surface) using laboratory provided, batch-certified, 6-liter Summa air canisters equipped with sample interval flow controllers. The air samples will be sealed, labeled, and transported via courier service to the laboratory.

The sample locations, descriptions, and depths will be recorded in the field book. Chain-of-custody procedures will be followed as outlined in the QAPP appended to the SMP.

4.2 GROUNDWATER SAMPLING

The following sampling equipment and methods will be used for groundwater sampling.

- Field book
- Project plans
- PPE in accordance with the HASP
- Oil/water interface probe
- Submersible pump, battery, and voltage controller
- Groundwater parameter meter
- Dedicated polyethylene tubing
- Twine
- PID
- Camera
- Towels or rags
- Laboratory-supplied sample bottles and coolers
- Ice
- Shipping supplies (as necessary)

Please refer to Langan's SOP No. 3 for detailed information on placing sampling equipment orders and SOP No. 12 for detailed information regarding groundwater sampling equipment and collection.

Sample Collection

Set the pump in the groundwater monitoring well to straddle the middle of the screened interval that is to be sampled. Groundwater samples will be collected via a low-flow methodology, with a flow rate of less than 0.5 liters per minute.

Using low-flow sampling methods, prior to sample collection, each well will be purged and the groundwater quality parameters will be recorded every 5 minutes. The sample will be collected after all of the following groundwater parameters have reached stabilization, which is defined when all parameter values are within the acceptable range shown below for three consecutive readings:

- pH ±0.1 unit
- Specific Conductance ±3%
- Temperature ±3%
- Dissolved Oxygen ±10% for values greater than 0.5 mg/L
- Turbidity ±10% for values greater than 5 NTU
- ORP/Eh ±10 millivolts

Samples will be collected directly from the pump discharge tubing.

Samples collected for VOC analysis will be collected into three 40 milliliter (mL) vials with a septum in the lid. The vials will be completely filled as to eliminate any headspace or bubbles. The remaining sample volume will placed into laboratory-supplied containers for laboratory analysis of remaining compounds.

The sample containers will be labeled, placed in a laboratory-supplied cooler, and packed on ice (to maintain a temperature of 4°C). The coolers will be transported via laboratory courier under standard chain-of-custody protocol to the laboratory for analysis.

The sample locations, descriptions, and depths will be recorded in the field book. Chain-of-custody procedures will be followed as outlined in the QAPP appended to the SMP.

The sampling equipment and purged groundwater will be disposed of as described above in Section 3.3.

4.3 SOIL VAPOR SAMPLING

The following sampling equipment and methods will be used for soil vapor sampling.

- Field book
- Project plans
- PPE in accordance with the HASP
- Tape measure
- Socket wrench set or pliers
- PID
- Camera

- Towels or rags
- Laboratory-supplied sample vacuum canisters and flow controllers or Tedlar bags
- Shipping supplies (as necessary)

Please refer to Langan's SOP No. 3 for detailed information on placing sampling equipment orders and SOP No. 13 for detailed information regarding soil vapor sampling equipment and collection.

Sample Collection

Use the PID to purge at least one sample train volume from the vapor point, and record the total VOC value.

Snugly fasten the vacuum canister and flow controller to the vapor point, and begin sample collection. Monitor and record the vacuum level as the sample collects, and cease sample collection at the designated time, or when the vacuum in the canister falls below 5 inches of mercury.

The sample locations, descriptions, and depths will be recorded in the field book. Chain-of-custody procedures will be followed as outlined in the Quality Assurance Project Plan (QAPP) appended to the SMP.

The sampling equipment will be disposed of as described above in Section 3.3.

5.0 FIELD SAMPLE IDENTIFICATION AND CUSTODY

5.1 SAMPLE LOCATION NUMBERING SYSTEM

- Groundwater, indoor air and sub-slab vapor samples will be designated with the sample location and collection date.

5.2 SAMPLE IDENTIFICATION

Each sample will be given a unique alphanumeric identifier similar to the classification system guidance shown below. Please refer to Langan's SOP No. 1 for detailed information regarding sampling nomenclature.

SAMPLE IDENTIFICATION

LL-*	NN-**	LL
Sample Type	Sample Number	QC Identifier

Sample Type: Soil Vapor – SV; SS – Sub-slab

Sample Number: Number referenced to a sample location map.

QC Identifier: DUP = Field Duplicate (blind sample, do not indicate sample location)

Field duplicate samples will be assigned identifiers that do not allow the laboratory to distinguish them as field duplicates. Each sample container will be labeled prior to packing for shipment. The sample identifier, site name, date, and time of sampling, and analytical parameters will be written on the label in waterproof ink and recorded in the field book.

5.3 ANALYTICAL METHODS

Soil vapor or indoor air samples may be analyzed for VOCs via USEPA Method TO-15. Groundwater may be analyzed for Part 375 Target Compound List VOCs. All analyses would be completed by a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory.

5.4 CHAIN OF CUSTODY

Please refer to Langan's SOP No. 4 for detailed information on laboratory chain-of-custody preparation and documentation. In general, the following procedures should be implemented:

- A chain-of-custody record (Figures 5.5.a or 5.5.b or similar) will accompany the sample containers during selection and preparation at the laboratory, during shipment to the field, and during return shipment to the laboratory.
- The chain-of-custody will identify each sample container and the analytical parameters for each, and will list the field personnel that collected the samples, the project name and number, the name of the analytical laboratory that will receive the samples, and the method of sample shipment.
- If samples are split and sent to different laboratories, a copy of the chain-of-custody record will be sent with each sample shipment.
- The chain-of-custody will be completed by field personnel as samples are collected and packed for shipment.
- Erroneous markings will be crossed-out with a single line and initialed by the author.

- The COMMENTS space will be used to indicate if the sample is a matrix spike, matrix spike duplicate, or matrix duplicate.

- After the samples have been collected and sample information has been listed on the chain-of-custody form, the method of shipment, the shipping cooler identification number(s), and the shipper airbill number will be entered on the chain-of-custody.

- A second member of the field team will review the chain-of-custody for completeness and accuracy whenever possible.

- Finally, a member of the sampling team will write his/her signature, the date, and time on the first RELINQUISHED BY space. Duplicate copies of each chain-of-custody must be completed.

- One copy of the chain-of-custody will be retained by sampling personnel. Blind duplicate samples will be identified on the copy retained by the sampling personnel. The other copy and the original will be sealed in a plastic bag and taped inside the lid of the shipping cooler without additional identification of blind duplicate samples.

- Sample shipments will be refrigerated at 4°C, typically by packing with ice, to preserve the samples during shipment.

- After the shipping cooler is closed, custody seals provided by the laboratory will be affixed to the latch and across the front and back of the cooler lid, and signed by the person relinquishing the samples to the shipper or courier.

- The seal will be covered with clear tape, and the cooler lid will be secured by wrapping with packing tape, if shipped.

- The cooler will be relinquished to the courier or shipper.

- The chain-of-custody seal must be broken to open the container. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the Project Manager, and the samples will not be analyzed.

- The samples must be delivered to the laboratory within 48 hours of collection.

5.5 SAMPLE DOCUMENTATION

The field team leader will retain a copy of the chain-of-custody and will ensure that the following information is recorded in the field book for each sample:

- Sample identifier

- Identification of sampled media (e.g., soil, groundwater, soil vapor)
- Sample location with respect to known reference point
- Physical description of sample location
- Field measurements, (e.g., pH, temperature, conductivity, water levels)
- Date and time of collection
- Sample collection method
- Volume of groundwater purged before sampling
- Number of sample containers
- Analytical parameters
- Preservatives used
- Shipping information
- Dates and method of sample shipments
- Chain-of-custody record numbers
- Tracking numbers, if shipped
- Sample recipient (e.g., laboratory name)

Figure 5.5.A - Air Sample Chain-of-Custody Form

YORK
ANALYTICAL LABORATORIES, INC.
120 RESEARCH DR. STRATFORD, CT 06615
(203) 325-1371 FAX (203) 357-0166

Field Chain-of-Custody Record - AIR

Page____ of____

NOTE: York's Std. Terms & Conditions are listed on the back side of this document.
This document serves as your written authorization to York to proceed with the analyses requested and your signature binds you to York's Std. Terms & Conditions unless superseded by written contract.

York Project No.

YOUR Information
Company:
Address:
Phone No.
Contact Person:
E-Mail Address:

Report To:
Company:
Address:
Phone No.
Attention:
E-Mail Address:

Invoice To:
Company:
Address:
Phone No.
Attention:
E-Mail Address:

YOUR Project ID

Purchase Order No.

Samples from: CT___ NY___ NJ___

Turn-Around Time
RUSH - Same Day ☐
RUSH - Next Day ☐
RUSH - Two Day ☐
RUSH - Three Day ☐
RUSH - Four Day ☐
Standard(5-7 Days) ☐

Report Type/Deliverables
Summary Report
Summary w/ QA Summary ____
CT RCP Package ____
NY ASP A Package ____
NY ASP B/CLP Pkg ____
NJDEP Reduced ____
Electronic Deliverables:
EDD (Specify Type) ____
Standard Excel ____
Regulatory Comparison Excel ____

Print Clearly and Legibly. All Information must be complete. Samples will NOT be logged in and the turn-around time clock will not begin until any questions by York are resolved.

Samples Collected/Authorized By (Signature)

Name (printed)

Air Matrix Codes
AI - INDOOR Ambient Air
AO- OUTDOOR Amb. Air
AE- Vapor Extraction Well/ Process Gas/Effluent
AS- SOIL Vapor/Sub-Slab

TO15 Volatiles and Other Gas Analyses
EPA TO-15 List
NYSDEC VI list
NYSDEC STARS List
Project Specific List by TO-15
NJDEP Target List
CTDEP RCP Target List
EPA TO-14A List
Tentatively Identified Compounds
Air VPH
Helium
Methane
OTHER_____

Detection Limits Required
≤1 ug/m³ ____
NYSDEC VI Limits ____
(VI sample submission)
NJDEP low level ____
Routine Survey ____
Other_____

Special Instructions

Sample Identification	Date Sampled	AIR Matrix	Canister Vacuum Before Sampling (in. Hg)	Canister Vacuum After Sampling (in. Hg)	Choose Analyses Needed from the Menu Above and Enter Below	Sampling Media
						6 Liter Summa canister ____
						Tedlar Bag ____
						6 Liter Summa canister ____
						Tedlar Bag ____
						6 Liter Summa canister ____
						Tedlar Bag ____
						6 Liter Summa canister ____
						Tedlar Bag ____
						6 Liter Summa canister ____
						Tedlar Bag ____
						6 Liter Summa canister ____
						Tedlar Bag ____
						6 Liter Summa canister ____
						Tedlar Bag ____
						6 Liter Summa canister ____
						Tedlar Bag ____

Comments

Samples Relinquished By ____ Date/Time ____
Samples Relinquished By ____ Date/Time ____

Samples Received By ____ Date/Time ____
Samples Received in LAB by ____ Date/Time ____

APPENDIX L

SMD SYSTEM OPERATION, MAINTENANCE, AND MONITORING PLAN

SUB-MEMBRANE DEPRESSURIZATION SYSTEM OPERATION, MAINTENANCE, AND MONITORING PLAN

for

1709 SURF AVENUE
BROOKLYN, NEW YORK
NYSDEC BCP Site No. C224398

Prepared For:

Coney Island Associates Phase 3 LLC
c/o BFC Partners
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LANGAN

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Figure 1 Site Location Map
Figure 2 Site Plan

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Appendix A Sub-Membrane Depressurization System Design Plan, Design Submittals and Manufacturer Specifications
Appendix B Startup Inspection and Field Checklist Forms
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1.0 INTRODUCTION

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) prepared this Operation, Maintenance, and Monitoring (OM&M) Plan on behalf of Coney Island Associates Phase 3 LLC (the "Volunteer") for the property located at 1709 Surf Avenue in Brooklyn, New York (the "site"). The site is a New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) site and is identified as Site No. C224398.

This OM&M Plan describes the design, installation, and operation and maintenance requirements of the sub-membrane depressurization system (SMDS) that was installed as part of the NYSDEC-approved remedial action. A SMDS was installed beneath the building's concrete foundation slab, which is designed to mitigate the potential for soil vapor intrusion into the new building. The SMDS was designed as an active system in accordance with New York City Mechanical Code MC 512 Sub-Slab Exhaust Systems, New York City Local Law 2009/071, Environmental Protection Agency (EPA) document EPA/625/R-92/016 for the Sub-Slab Depressurization of Large Buildings and Schools, and the New York State Department of Health (NYSDOH) October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York (SVI Guidance).

1.1 Site Description

The about 65,800-square-foot (1.511 acre) site is located at 1709 Surf Avenue in the Coney Island neighborhood of Brooklyn, New York and is identified on the Kings County Tax Map as Block 7061, Lots 16, 20, 21, 27 and a portion of Lot 14. The site is being developed into a 12-story, mixed-use residential and commercial building. The site is bound by a 15-foot paved segment of Lot 14 followed by eight 2- to 4-story mixed residential and commercial buildings, and a 1-story commercial building to the north, 17th Avenue followed by vacant land and a 10-story building under construction to the east, Surf Avenue followed by Maimonides Park to the south, and West 19th Street followed by a 16-story mixed residential and commercial building to the west. A Site Location Map is provided as Figure 1 and a Site Location Plan is provided as Figure 2.

Prior to redevelopment, the site was historically been used for various residential, institutional, and commercial purposes including a railroad (1895 to 1950) on Lot 14; a hotel (1895) on Lots 16, 20 and 21; a school (1906) on Lot 16; an unspecified store (1906 to 1950) and a drycleaner (1965 to 2007) on Lot 20; unspecified stores on Lot 21 (1906 to 1989); and a gasoline filling station with petroleum bulk storage, auto service station (1968 to 2003) and a car wash (1991 to 2003) on Lot 27. Between 1994 and 2007, the buildings on Lots 16, 20, 21, and 27 were vacated and all structures were razed. By 2009, all lots had been paved for use as a parking lot. Lot 16 was subsequently re-developed with a one-story community health center in 2015. Lots 14, 20, 21, and 27 were continued to be used for parking and construction equipment storage.

Site redevelopment includes construction of a 12-story mixed-use commercial and residential building with open-air parking. The proposed development will include a slab-on-grade ground

level with tenant amenity space (i.e. package room, bike rooms, gym, lounge area) and utilities, commercial space, and a community facility. The second through twelfth floors of the new development will be occupied by residential units. All of the new residential units are designated as affordable housing.

2.0 SMDS DESIGN AND INSTALLATION

2.1 SMDS Design and Installation

The SMDS will create a depressurized (low vacuum) field beneath the floor slab by extracting the sub-slab air with a fan assembly. This low vacuum field reverses the potential natural pressure gradient and diverts potentially impacted vapors from the subsurface of the building to the atmosphere above its rooftop, thereby reducing the potential for vapor intrusion. Depressurization is not required in areas where foundation elements (i.e., elevator pits) extend below the groundwater table, or in areas outside of the building's extent on the property.

The SMDS comprises four noncontiguous networks of sub-membrane collection pipes constructed of 4-inch-diameter, schedule 80 polyvinyl chloride (PVC) perforated piping. The perforated piping sections are connected to 4-inch-diameter solid schedule 80 PVC piping that connect to solid 4-inch-diameter metal riser pipes. The piping was installed beneath the foundation slab within a continuous permeable aggregate layer across the area consisting of 0.75-inch virgin stone placed above a geotextile fabric. The aggregate layer was covered by a vapor barrier/waterproofing membrane system. The vapor barrier/waterproofing membrane extended laterally under the entire building footprint and vertically around the sub-grade portions of the perimeter foundation walls. Precise Contracting, LLC (Precise) installed a continuous vapor barrier system consisting of Aussie Skin 550G® waterproofing membrane and associated sealing tape below the slab-on-grade and foundation elements across the building footprint and atop the gravel layer of the SMDS. Welds, seams, and penetrations were sealed in accordance with manufacturer's specifications to prevent preferential pathways for vapor migration.

Eight vacuum monitoring points (VMP-1 to VMP-8) were installed within the gravel layer and accessible via a secured port in the building slab during building construction. Table 2.1 – Vacuum Monitoring Point Construction Details, summarizes the vacuum monitoring point identification number and location for each monitoring point.

Table 2.1 – Vacuum Monitoring Point Construction Details

Well ID	Latitude			Longitude		
	Deg	Min	Sec	Deg	Min	Sec
VMP-1	73	59	8.01	40	34	33.55
VMP-2	73	59	7.54	40	34	32.75
VMP-3	73	59	7.53	40	34	31.48
VMP-4	73	59	6.7	40	34	31.97
VMP-5	73	59	6.17	40	34	31.61
VMP-6	73	59	5.11	40	34	31.76
VMP-7	73	59	5.42	40	34	32.5
VMP-8	73	59	5.46	40	34	33.8

The sub-slab piping systems each connect to a 4-inch-diameter metal riser pipe (per NYC Building

and Mechanical Code) that penetrate the building's slab and direct soil vapor to blowers on the building roof. The rooftop blowers are the Airtech 3BA1310-7AT26 and Airtech 3BA1300-7AT06. There is no proposed accessory or recreational space near the exhaust locations, and the SMDS exhaust points are located at least 10 feet from air intakes or operable windows. The SMDS is equipped with a visual alarm placed in a building maintenance office to notify of a potential system failure. The blowers are operated in accordance with manufacturer's specifications and recommendations. The minimum required flow rate of each blower is as follows:

- Suction Fan 1 (SF-1): 37 standard cubic feet per minute (scfm) at 12 inches of water column.
- Suction Fan 2 (SF-2): 23 scfm at 11 inches of water column.
- Suction Fan 3 (SF-3): 27 scfm at 11 inches of water column.
- Suction Fan 4 (SF-4): 39 scfm at 12 inches of water column

Above-grade components of the SMDS (including the VMPs, riser pipes, blowers, and related accessories/monitoring devices) were installed during building construction. After the building is complete and before building occupancy, initial system start-up testing (Section 3.2.1) will be performed to verify that all components are installed, and that the system is operating within design parameters.

Design layout and details for the SMDS is provided as Appendix A. SMDS installation activities were conducted in accordance with the site-specific health and safety plan (HASP), provided as Appendix I of the July 2025 Draft Site Management Plan.

3.0 SYSTEM OPERATIONS, MAINTENANCE AND MONITORING

The OM&M Plan has been prepared based on NYSDOH guidance and EPA guidance document EPA/625/R-92/016 concerning active depressurization of large buildings and schools (June 1994).

3.1 General

This OM&M Plan provides a brief description of the measures necessary to operate, monitor, and maintain the mechanical components of the SMDS, and includes:

- Procedures for SMDS start-up and testing; and
- Procedures necessary to allow individuals unfamiliar with the site to operate, monitor, and maintain the SMDS.

The OM&M Plan may be updated periodically to reflect changes in site conditions or the manner in which the SMDS is operated and maintained. Design submittals and manufacturer specifications are provided in Appendix A.

3.2 SMDS Operation and Maintenance

3.2.1 SMDS Startup and Testing

Prior to initial SMDS start-up, all accessible SMDS components will be inspected. The equipment will be started in accordance with the manufacturer's recommendations. After SMDS system start-up, Langan will perform a communication test to document the ability of the depressurization field and air flow to extend throughout the target mitigation area.

System testing for the initial start-up will be performed as follows:

- While the system is operating, smoke tubes will be used to check for leaks through concrete cracks, floor joints, near the monitoring points, and at exposed above-grade piping connections associated with the lowest-level slab. Any leaks identified will be properly sealed.
- The blower-malfunction warning device will be tested.
- Airflow rates will be measured through the sample ports with a TSI VelociCalc meter to document that airflow within the system is consistent with design calculations.
- Differential pressure measurements will be collected using an air velocity meter at all eight VMPs (VMP-1 through VMP-8) to verify pressure field extension and at the blower to document that vacuum conveyance is consistent with the design calculations. Differential pressures at VMP-1 through VMP-8 should meet the target vacuum of 0.02 inches of water column (IWC).
- The building's heating, ventilation, and air conditioning (HVAC) system is operating under normal conditions.

The system testing described above will be conducted during the initial system startup and if, in

the course of the SMDS lifetime, significant changes are made to the system and the system is restarted.

If pressure field monitoring indicates that the sub-slab vacuum extents are not reaching the edges of the foundation slabs, supplemental measures for system optimization will be coordinated with the NYSDEC and NYSDOH, which may include upgrades to the SMDS or blower and/or modifications to the HVAC system.

The checklist and inspection form to be completed during the startup inspection are included in Appendix B.

3.2.2 Routine System Operation

The SMDS and its vacuum blowers will operate continuously after the initial start-up in accordance with appropriate design specifications and parameters, the manufacturer's operation manual, and Site Management Plan (SMP) requirements.

Routine equipment maintenance is the responsibility of the remedial party and/or building management. The blower assembly and its appurtenances shall be inspected at the interval specified in the manufacturer's operation manual. Routine equipment maintenance may include, but is not limited to, replacing the blower motor or other parts, replacing vacuum pressure gauges, replacing/cleaning air filters, and testing the remote alarm system.

If any technical difficulties or non-optimal operating conditions are encountered with the SMDS, the property owner and/or building management shall complete any necessary modifications or repairs to the system to bring the system into compliance with appropriate design specifications and parameters. The remedial party, NYSDEC and NYSDOH shall be notified of any significant modifications or repairs that are planned.

3.2.3 Routine System Inspection (Monthly)

The property owner and/or building management is responsible for performing monthly routine inspection and maintenance of the SMDS. Routine inspection/equipment maintenance may include, but is not limited to, replacing the in-line fan motor or other parts, replacing pressure gauges or sample ports, and testing the remote alarm system.

Routine equipment maintenance, repairs, and/or adjustments will be determined based on the life expectancy and warranty for the specific part as well as visual observations over time. The need for repairs and/or adjustments will depend upon operating parameters compared to the parameters observed when the system was started up.

If technical difficulties or non-optimal operating conditions are encountered with the SMDS, the property owner and/or building management will complete any necessary modifications or repairs to the system to bring the system into compliance with appropriate design specifications and parameters (to be coordinated with the NYSDEC).

3.2.4 Non-Routine Maintenance

Non-routine maintenance may also be required during SMDS operation, including the following situations:

- If the building's owner or maintenance staff report that the alarm device indicates the SMDS is not operating properly;
- During monthly inspections, if the building's owner or maintenance staff report any observable deficiencies with the SMDS;
- The SMDS becomes damaged;
- The building has undergone renovations that may reduce the effectiveness of the SMDS; or
- There are changes to the building use or occupancy.

The NYSDEC will be informed within 24 hours upon discovery of SMDS failure. Repairs or adjustments will be made to the system as appropriate and as per manufacturer guidelines, within 15 days of the equipment failure, or whenever possible (i.e., pending availability of parts). If necessary, the system will be redesigned and restarted. Activities conducted during non-routine maintenance visits will vary.

3.3 SMDS Monitoring

3.3.1 Performance Monitoring

Performance monitoring will be conducted by the Remedial Engineer (RE) or an individual under the supervision of the RE to document the effectiveness of the SMDS at the following milestones/intervals:

- At the commissioning event and start-up inspection
- Annually, concurrent with the annual site inspections
- After any severe weather or other emergency conditions (natural disasters and/or fires) that has or may have damaged the system (if necessary)
- After any significant repairs and/or modifications

Performance monitoring will include the similar procedures listed for the commissioning and startup inspection as stated in Section 3.2.1.

3.3.2 System Monitoring Devices and Alarms

The SMDS has a warning device that will be placed in the building maintenance office to alert staff that the system is not operating properly. The alarm will be labeled as part of the vapor mitigation system and will direct staff to notify the appropriate parties listed in this SMP. In the event that warning device is activated, applicable maintenance and repairs will be conducted and

the SMDS will be restarted. Operational problems identified by the building's owner or maintenance staff or problems observed during monthly inspections will be noted in the Periodic Review Report (PRR) to be prepared for that reporting period.

3.3.3 System Performance Monitoring Schedule

After the startup inspection, subsequent will be performed on an annual basis and after severe conditions (i.e., flooding). Unscheduled inspections and/or sampling may be necessary when a suspected failure of the SMDS has been reported or an emergency occurs that is deemed likely to affect the operation of the system. SMDS components to be monitored include, but are not limited to, the components detailed in Table 3.3.3 below.

Table 3.3.3: Remedial System Monitoring Requirements and Schedule

SMDS Component	Monitoring Parameter	Operating Range	Monitoring Schedule
Vacuum Monitoring Points	Vacuum Pressure	-0.02 inches of water column (target)	Annual
Vacuum Gauges	Vacuum Pressure	-30 inches of water column (maximum)	Annual
Exhaust Points	Motor Operation and Air Flow Direction	N/A	Annual
Remote Alarm System	Functionality & Integrity	N/A	Monthly/Annual
Exposed Riser Piping	Functionality, Integrity, and Labeling	N/A	Annual
Vacuum Blowers	Functionality & Integrity	N/A	Monthly/Annual

3.3.4 System Scale Back and Dismantling

Operation of the active SMDS will not be discontinued without written approval by the NYSDEC and NYSDOH project managers. A proposal to discontinue the SMDS may be submitted by the Volunteer (Coney Island Associates Phase 3 LLC or its successors) based on confirmatory data that justifies such request. The SMDS will remain in-place and operational until permission to discontinue its use is granted in writing by the NYSDEC project manager in consultation with the NYSDOH project manager.

4.0 CONTACT LIST

The following contact list will be used to coordinate OM&M activities:

Name	Project Role	Affiliation	Phone Number(s)	Email Address
Donald Capoccia	Volunteer and Remedial Party	Coney Island Associates Phase 3 LLC c/o BFC Partners	718.422.9999	dcapoccia@bfcnyc.com
Jason Hayes	Engineer of Record	Langan	212.479.5427	jhayes@langan.com
Joseph Conboy	Quality Control Officer	Langan	609.828.8055	jconboy@langan.com
Brian Gochenaur	Associate Principal	Langan	212.479.5479	bgochenaur@langan.com
Lamees Esmail	Project Manager	Langan	212.479.5400	lesmail@langan.com
Tony Moffa	Corporate Health & Safety Manager	Langan	215.491.6545	tmoffa@langan.com
Tony Carrol	Remediation Contractor	Precise Contracting Inc.	917.806.8504	preciseconstruction@verizon.net
Paul Browne	Electrical Contractor	Tritech Electrical	845.222.5944	paul@tritechelectrical.com
Michael Early	Plumbing Contractor	M. Early Plumping and Heating Corp.	718.499.9799	michaelearly@earlyplumbing.com

5.0 REPORTING

The activities associated with monthly routine system inspections and annual performance monitoring will be documented in inspection forms. Scheduled and unscheduled inspections or monitoring of the SMDS will also be documented in daily field reports and applicable inspection forms. The construction of the SMDS was summarized in the daily field reports which were submitted to the NYSDEC and NYSDOH. The maintenance and performance monitoring inspections each calendar year will be summarized in the Annual PRR.

5.1 Monitoring and Maintenance Reporting

5.1.1 Routine System Inspection Forms (Monthly)

Monthly routine system inspection forms and any other information generated during regular operations at the site will be kept on file on site. The checklists will be completed during each monthly routine system inspection event and include the following information:

- Date of event;
- Name, company, and position of person(s) conducting the maintenance event;
- Description of maintenance event performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Monthly routine system inspection forms are to be completed and kept on file by the property owner and/or building management. A blank inspection form to be used for the monthly routine system inspection is included as Appendix C.

5.1.2 Non-Routine Maintenance Forms

As needed, non-routine maintenance forms will include the following information:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance event;
- Description of non-routine maintenance event performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

5.1.3 Annual Monitoring and Maintenance Reports

Langan will perform annual monitoring inspections to document and evaluate the performance of the SMDS. Annual PRRs are further discussed in Section 5.4. Blank annual performance monitoring inspection forms to be used for the Annual PRRs are included as Appendix C.

5.2 Annual Periodic Review Reports

The initial PRR will be submitted to the NYSDEC 16 months after the Certificate of Completion is issued. Subsequent PRRs shall be submitted annually to the NYSDEC or at another frequency as may be required by the Department. In the event that the site is subdivided into separate parcels with different ownership, a single PRR will be prepared that addresses the site.

The SMDS portion of the Annual PRRs will include:

- Results of any required unscheduled periodic site inspections and severe condition inspections, if applicable;
- Inspection forms and other records generated for the SMDS during the reporting period, in electronic format;
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period (if any), submitted electronically in an NYSDEC-approved format;
- A site evaluation, which includes the following:
    - The compliance of the remedy with the requirements of the SMP and this OM&M Plan;
    - The operation and the effectiveness of the SMDS, etc., including identification of any needed repairs or modifications;
    - Any new conclusions or observations regarding site contamination based on inspections;
    - Recommendations regarding any necessary changes to the remedy; and
    - The overall performance and effectiveness of the remedy.
- A performance summary for the SMDS during the calendar year, including information such as:
    - The number of days the system was run for the reporting period;
    - A description of breakdowns and/or repairs along with an explanation for any significant downtime;
    - A description of the resolution of performance problems; and
    - Comments, conclusions, and recommendations based on data evaluation.

Annual PRRs will be provided in electronic format (e.g., PDF) to the NYSDEC Project Manager.



Legend

Approximate Site Boundary

2,000 0 2,000

SCALE IN FEET

Notes:

1. Basemap adapted from United States Geological Survey (USGS) 7.5-Minute Series Topographical Maps, Coney Island, New York, Quadrangle.

LANGAN

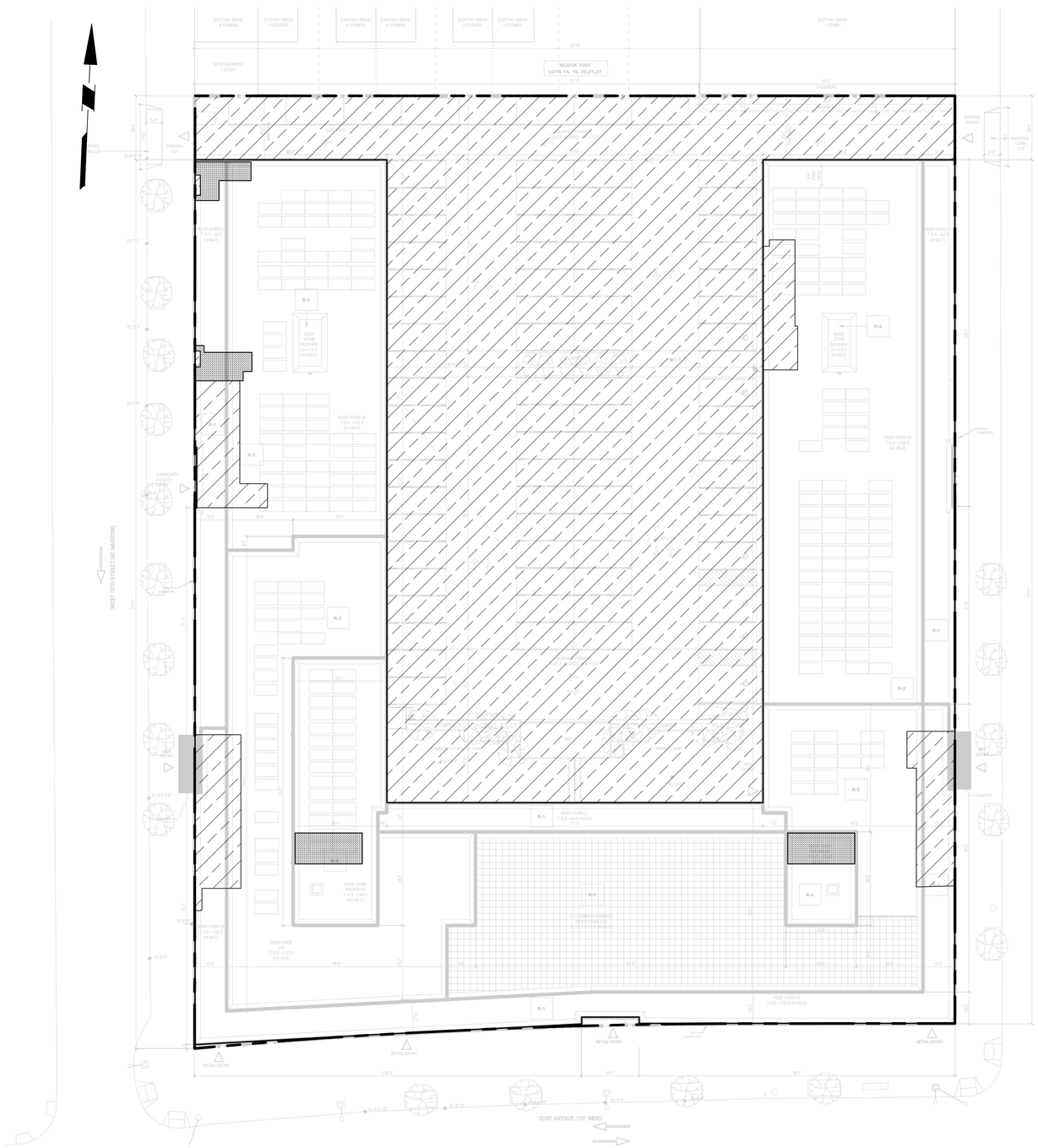
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Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC

Collectively known as Langan

Project	**1709 SURF AVE** BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27 BROOKLYN KINGS COUNTY NEW YORK
Figure Title	**SITE LOCATION MAP**
Project No.	170747001
Date	8/3/2023
Scale	1"=2,000'
Drawn By	GS
Figure No.	1

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BLOCK 7061
LOTS 14, 16, 20,21,27
WEST 16TH STREET (60' NARROW)
WEST 17TH STREET (60' NARROW)
SURF AVENUE (120' WIDE)
R-1
R-2
R-3
R-4
COMMUNITY FACILITY
RETAIL ENTRY
CANOPY
PARKING ENTRY
EXISTING BRICK 4 STORIES
EXISTING BRICK 1 STORY
ROOF OVER L1 T.O.S. +52.0' (H=44.3')
ROOF OVER L2 T.O.S. +52.0' (H=44.3')
ROOF OVER L3 T.O.S. +52.0' (H=44.3')
ROOF OVER L4 T.O.S. +132.0' (H=114.0')
ROOF OVER L5 T.O.S. +52.0' (H=44.3')
ROOF OVER BULKHEAD T.O.S. +144.0' (H=126.0')
ROOF STAIR BULKHEAD T.O.S.+112.0' (H=95.0')
T.O.SLAB +132.0' (H=114.0')
T.O.SLAB +52.0' (H=44.3')
T.O.SLAB +112.0' (H=95.0')
T.O.SLAB +132.0' (H=114.0')
T.O.SLAB +52.0' (H=44.3')
T.O.SLAB +52.0' (H=44.3')
T.O.SLAB +52.0' (H=44.3

GENERAL NOTES

1. SCOPE OF WORK INCLUDES THE INSTALLATION OF A SUB-MEMBRANE DEPRESSURIZATION (SMD) SYSTEM IN CONJUNCTION WITH DOB NOW JOB NUMBER B00917292-S9.
2. THE COMPONENTS SHOWN ARE NOT TO SURVEYED COORDINATES. THE CONTRACTOR SHALL COORDINATE THE EXACT LOCATIONS AND LAYOUT OF THE VENTING SYSTEM COMPONENTS IN THE FIELD BASED ON ACTUAL SITE CONDITIONS AND OTHER PROPOSED WORK.
3. DRAWING SET NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL, OR OTHER REFERENCE EXCEPT FOR SMD SYSTEM.
4. REFER TO ARCHITECTURAL DRAWINGS FOR INSULATION REQUIREMENTS (INSULATION NOT REQUIRED AROUND SMD SYSTEM PIPING).
5. ANY DEVIATION FROM THIS DESIGN MUST BE SUBMITTED TO THE OWNER AND ENGINEER OF RECORD FOR APPROVAL.
6. INSTALLATION OF THE SMD SYSTEM COMPONENTS AND RISER PIPE MUST BE COORDINATED WITH THE INSTALLATION OF OTHER UTILITIES AND STRUCTURAL COMPONENTS.
7. INSTALLATION OF THE SMD SYSTEM COMPONENTS, TESTING (I.E., PRESSURE TESTING), AND START-UP SHALL BE COMPLETED UNDER THE OVERSIGHT OF THE ENGINEER OF RECORD.
8. WE ASSUME THAT ALL INTERIOR SPACE AIR PRESSURES WILL BE BALANCED OR POSITIVELY PRESSURIZED WITH VENTILATION SYSTEMS AND THE INDOOR AIR PRESSURE WILL BE ESSENTIALLY EQUAL TO OR GREATER THAN THE OUTDOOR AIR PRESSURE.

DRAWING LIST

SHEET NO.	SHEET TITLE	DOB SET
H-001.00	SUB-MEMBRANE DEPRESSURIZATION SYSTEM NOTES	1
H-100.00	SITE PLAN	2
H-101.00	SUB-MEMBRANE DEPRESSURIZATION SYSTEM PLAN	3
H-102.00	SUB-MEMBRANE DEPRESSURIZATION SYSTEM RISER PLAN (LEVEL 01)	4
H-103.00	SUB-MEMBRANE DEPRESSURIZATION SYSTEM RISER PLAN AND DETAILS (LEVEL 2-10)	5
H-104.00	SUB-MEMBRANE DEPRESSURIZATION SYSTEM RISER PLAN (LEVEL 11 TO ROOF)	6
H-105.00	SUB-MEMBRANE DEPRESSURIZATION SYSTEM BLOWER PLAN AND DETAILS	7
H-201.00	SUB-MEMBRANE DEPRESSURIZATION SYSTEM DETAILS	8
EN-001.00	ENERGY CODE COMPLIANCE	9

SCOPE OF WORK

- INSTALLATION OF THE SMD STONE LAYER AND SMD/VAPOR COLLECTION SUB-SLAB PIPING
- INSTALLATION OF VAPOR BARRIER MEMBRANE, BUILDING SLAB, AND PERMANENT MONITORING POINTS
- INSTALLATION OF RISER PIPES AND ROOF-MOUNTED PROCESS EQUIPMENT
- INSTALLATION OF ELECTRICAL CONNECTIONS TO PROCESS EQUIPMENT
- STARTUP OF THE REMEDIAL SYSTEM

SUB-MEMBRANE DEPRESSURIZATION SYSTEM NOTES

1. REFER TO DRAWINGS H-100.00 THROUGH H-105.00 AND H-201.00 FOR SMD SYSTEM DETAILS AND SECTIONS.
2. THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR OWNER APPROVAL PRIOR TO THE SMD SYSTEM INSTALLATION. ANY CONDITION OR DETAIL NOT DEPICTED IN THESE DRAWINGS SHALL BE PROVIDED AS A SHOP DRAWING FOR APPROVAL.
3. SMD SYSTEM PIPE, FITTINGS, UNIONS, CLEANOUTS, SLEEVES, SUPPORTS, HANGERS, AND RELATED ACCESSORIES SHALL BE FURNISHED IN ACCORDANCE WITH THE REQUIREMENTS FOR PLUMBING SANITARY VENT PIPING IN DIVISION 15. REFER TO PLUMBING DRAWINGS FOR SMD SYSTEM PIPING SUPPORTS.
4. SUBMIT DETAIL OF ANY SITE SPECIFIC SMD SYSTEM CONDITIONS NOT SHOWN FOR OWNER APPROVAL.
5. SLOPE ALL SOLID (UNPERFORATED) PIPE A MINIMUM OF 1% UNIFORMLY DOWNWARD TOWARDS SMD SYSTEM PIPING OR CONDENSATE DRAINS. ANY ACCUMULATED MOISTURE/WATER MUST BE ALLOWED TO DRAIN TO THE SUBSURFACE. PIPING SHALL NOT BE TRAPPED AND CONDENSATE DRAINS SHALL NOT BE INSTALLED IN ABOVE SLAB PIPING.
6. CONDENSATE DRAIN FOR SUB-SLAB PIPING MAY BE AN OPTION, WITH WRITTEN ENGINEER APPROVAL, IF CONFLICT WITH UTILITIES REQUIRES REVERSE SLOPE (SEE DETAIL 8/H-201).
7. COAT ANY PIPING IN DIRECT CONTACT WITH CONCRETE IN ACCORDANCE WITH PLUMBING CODES.
8. 3/4-INCH STONE USED IN DEPRESSURIZATION LAYER SHALL BE VIRGIN, COARSE, ANGULAR, WASHED STONE WITH THE FOLLOWING GRADATION (ASTM/AASHTO #5 SIZE STONE)

SIEVE SIZE	% PASSING BY WEIGHT
1 ½"	100
1"	90-100
¾"	20-55
⅜"	0-10
#4	0-5

9. DESIGN DETAILS AND DRAWINGS ARE ADAPTED FROM EPA DOCUMENT EPA/625/R-92/016.
10. ALL PIPING SHALL BE INSTALLED IN ACCORDANCE WITH THE NEW YORK CITY MECHANICAL AND PLUMBING CODE, INCLUDING, BUT NOT LIMITED TO, THOSE REQUIREMENTS PERTAINING TO:
    - PROTECTION OF SYSTEM COMPONENTS
    - TRENCHING, EXCAVATION, AND BACKFILL
    - STRUCTURAL SAFETY
    - PIPING SUPPORT
    - JOINTS
    - RISER LOCATION
    - MATERIALS OF CONSTRUCTION
10. ALL ABOVEGROUND AND BELOW GRADE SMD SYSTEM PIPES SHALL BE PROVIDED WITH PIPE HANGERS IN ACCORDANCE WITH THE REQUIREMENTS ON THE PLUMBING DRAWINGS AND SPECIFICATIONS.
11. UNLESS OTHERWISE SPECIFIED, ALL UNDERGROUND PIPING SHALL BE CONSTRUCTED OF 4"Ø SCHEDULE 80 POLYVINYL CHLORIDE (PVC) AND ALL ABOVEGROUND RISER PIPING SHALL BE CONSTRUCTED OF 4"Ø CAST IRON OR GALVANIZED STEEL OR OTHER MATERIAL THAT COMPLIES WITH BUILDING CODE.
12. ALL FITTINGS AND CONNECTIONS FOR THE VAPOR COLLECTION PIPE SHALL BE 4-INCH-DIAMETER SCHEDULE 40 PVC FITTINGS, MADE BY THE SAME MANUFACTURER AS THE 4-INCH-DIAMETER PIPE, AND OF THE TYPE RECOMMENDED BY THE MANUFACTURER FOR USE WITH THE 4-INCH-DIAMETER PIPE. SECURE ALL FITTINGS WITH 2-INCH-WIDE TILE TAPE.
13. INSTALLATION OF THE SUB-SLAB COMPONENTS, AND RISER PIPING AND VENT, AND ROOF PENETRATIONS MUST BE COORDINATED WITH OTHER TRADES FOR THE INSTALLATION OF OTHER UTILITIES AND STRUCTURAL COMPONENTS.
14. RISER PIPE FROM SUB-SLAB TO ROOF SHALL BE COORDINATED WITH THE ARCHITECT AND MECHANICAL ENGINEER. RISER PIPE SHALL BE EXTENDED TO THE ROOF WITH MINIMAL CHANGES IN DIRECTION (i.e., NO MORE THAN 3 ROUTING ALTERATIONS FROM A STRAIGHT VERTICAL RISER PIPE). NO 90-DEGREE CHANGES IN DIRECTION ARE ALLOWED, 45-DEGREE FITTINGS ARE PREFERRED.
15. SYSTEM INSTALLATION SHALL ADHERE TO: OCTOBER 2006 FINAL GUIDANCE FOR EVALUATING SOIL VAPOR INTRUSION IN THE STATE OF NEW YORK PREPARED BY NEW YORK STATE DEPARTMENT OF HEALTH (NYSDOH), ALL APPLICABLE PORTIONS OF THE BUILDING CODE OF THE CITY OF NEW YORK, INCLUDING BUT NOT LIMITED TO 2022 NEW YORK CITY MECHANICAL CODE, CHAPTER 5, SECTION MC 512 SUBSLAB SOIL EXHAUST SYSTEMS.
16. RISER PIPE (REFER TO ARCHITECTURAL AND MEP DRAWINGS FOR DESIGN AND LOCATION OF ABOVE-SLAB PIPING) SHALL BE EXTENDED TO THE ROOF WITH MINIMAL CHANGES IN DIRECTION AS SHOWN ON THE MECHANICAL AND PLUMBING DRAWINGS. HORIZONTAL RISER PIPE RUNS MUST MAINTAIN A MINIMUM SLOPE OF 1/8 INCHES PER LINEAR FOOT, SLOPING DOWNWARD TOWARD THE PERFORATED PIPING OR SLAB (FOR BELOW GRADE SOLID PIPE) OR SLOPING BACK TOWARDS THE RISER (FOR ABOVE-SLAB SOLID PIPE).
17. RISER PIPE SHALL BE AIR-TIGHT. THE CONTRACTOR SHALL PERFORM PRESSURE TESTING TO DEMONSTRATE THAT THE RISER PIPE IS AIR-TIGHT BEFORE IT IS PUT INTO SERVICE. PRESSURE TESTING SHALL BE COMPLETED AT EVERY VERTICAL VENT RISER PIPE TO CONFIRM NO DAMAGE TO THE ABOVE GRADE SMD PIPES. PRESSURE TESTING WILL INVOLVE ISOLATING THE RISERS AND SHALL GENERALLY FOLLOW THE TESTING PROCEDURES SET FORTH IN ASME B31.1. A MINIMUM OF 2 INCHES OF MERCURY [IN.HG] SHALL BE APPLIED TO THE PIPE AND MAINTAINED FOR A MINIMUM OF 10 MINUTES. ANY DAMAGE OR DEFECT DETECTED SHALL BE REPAIRED OR REPLACED.
18. EXHAUST STACKS SHALL BE SECURELY ANCHORED WITH ADEQUATE STRUCTURAL SUPPORTS AS SHOWN ON DETAILS AND REQUIRED IN THE SPECIFICATIONS.
19. LOCATIONS OF RISER PIPE FROM SUB-MEMBRANE TO ROOF SHALL BE COORDINATED WITH ARCHITECT AND MECHANICAL ENGINEER. RISER PIPE SHALL BE EXTENDED TO THE ROOF WITH MINIMAL CHANGES IN DIRECTION. SEE DRAWINGS H-101.00 THROUGH H-105.00 FOR RISER LOCATIONS.
20. RISER PIPE MUST BE CLEARLY LABELED "CAUTION: DO NOT ALTER SUB-SLAB VAPOR VENT PIPE" IN EACH ACCESSIBLE AREA A MINIMUM OF EVERY 10 LINEAR FEET OF RISER PIPE RUN.
21. SMD SYSTEM EFFLUENT DISCHARGE POINTS SHALL BE:
    - COORDINATED WITH ARCHITECT AND MECHANICAL ENGINEER;
    - ABOVE THE EAVE OF THE ROOF (PREFERABLY, ABOVE THE HIGHEST EAVE OF THE BUILDING AND AT LEAST 24-INCHES ABOVE THE SURFACE OF THE ROOF);
    - AT LEAST 10 FEET ABOVE GROUND LEVEL;
    - AT LEAST 10 FEET AWAY FROM ANY OPERABLE AIR INTAKE THAT IS LESS THAN 2 FEET BELOW THE EXHAUST POINT; AND
    - 10 FEET FROM ANY ADJOINING OR ADJACENT BUILDINGS, OR HVAC INTAKES OR SUPPLY REGISTERS
21. ALL EXTERNAL PIPES SHALL BE PAINTED WITH A UV-RATED AND/OR CORROSION RESISTANT COATING, DEPENDING ON PIPE MATERIAL.
22. CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS (SIGNED AND SEALED BY A NYS-LICENSED PROFESSIONAL ENGINEER) OF COMPLETE SMD SYSTEM TO OWNER FOLLOWING INSTALLATION. THE SUBSURFACE SYSTEM COMPONENTS (E.G. PIPES) SHALL BE SURVEYED BY A NYS LICENSED SURVEYOR.

WATERPROOFING/VAPOR BARRIER NOTES

1. REFER TO ARCHITECTURAL AND FOUNDATION PLANS FOR WATERPROOFING/VAPOR BARRIER (WP/VB) DESIGN.
2. WP/VB SHALL BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE MANUFACTURER GUIDELINES AND DETAILS.
3. WP/VB SHALL BE INSTALLED BY A MANUFACTURER-CERTIFIED OR -APPROVED INSTALLER.
4. WP/VB SHALL BE INSPECTED IMMEDIATELY BEFORE CONCRETE IS PLACED. ALL PENETRATIONS, HOLES, AND/OR TEARS SHALL BE SEALED BEFORE CONCRETE IS PLACED. THE WP/VB DETAILS SHOWN ARE GENERALIZED IN NATURE AND ARE INTENDED TO INDICATE THE EXTENT AND LOCATIONS OF THE WP/VB. ACTUAL INSTALLATION AND REPAIRS SHALL BE IN ACCORDANCE WITH THE WP/VB MANUFACTURER'S STANDARD DETAILS AND WRITTEN INSTALLATION INSTRUCTIONS. ALL STANDING WATER AND SOIL/DEBRIS MUST BE REMOVED FROM THE VAPOR BARRIER BEFORE CONCRETE IS PLACED. POTABLE WATER OR COMPRESSED AIR CAN BE USED TO CLEAN THE SURFACE BEFORE CONCRETE IS PLACED.
5. CONTRACTOR SHOP DRAWINGS INDICATING WP/VB INSTALLATION DETAILS AND METHODS SHALL BE REVIEWED AND APPROVED BY THE MATERIAL MANUFACTURER PRIOR TO SUBMITTAL TO THE ENGINEER OF RECORD FOR REVIEW.
6. ALL WP/VB ACCESSORY MATERIALS, INCLUDING BUT NOT LIMITED TO TAPE, SEALANT, LIQUID MEMBRANE, ETC. SHALL BE COMPATIBLE WITH AND DESIGNED FOR USE WITH THE SELECTED WP/VB.
7. INSTALLED WP/VB MATERIALS AND INSTALLATION SHALL HAVE WARRANTIES PROVIDED BY THE INSTALLER AND MANUFACTURER.
8. DO NOT PENETRATE THE VAPOR BARRIER MEMBRANE. CARE SHALL BE TAKEN DURING THE PLACEMENT OF THE SLAB REINFORCING REBAR AND THE POURING OF THE BUILDING SLAB TO PREVENT ACTIVITIES [I.E., VEHICLE TRAFFIC DIRECTLY ON TOP OF VAPOR BARRIER] WHICH MAY DAMAGE THE VAPOR BARRIER PRIOR TO INSTALLING THE BUILDING SLAB. IF VEHICLE TRAFFIC OVER THE VAPOR BARRIER IS REQUIRED, PROPER PRECAUTIONS SHALL BE COORDINATED WITH THE ENGINEER OF RECORD PRIOR TO INITIATING SUCH WORK. IT IS THE GENERAL CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE MEMBRANE IS NOT PENETRATED OR DAMAGED.
9. THE WP/VB SHALL BE INSPECTED FOR HOLES, PUNCTURES AND GAPS. ALL LEAKS SHALL BE PATCHED PER THE MANUFACTURER'S INSTRUCTIONS AND RETESTED.
10. THE WP/VB MATERIALS ARE INTENDED TO MITIGATE INTRUSION OF CONTAMINATED SUB-SLAB VAPORS INTO OCCUPIED BUILDING SPACES. IF IS ALSO REQUIRED, THIS SHALL BE COORDINATED ACCORDINGLY TO ENSURE COMPATIBLE MATERIALS ARE SELECTED AND APPLIED.

INSPECTION SCHEDULE

No.	MILESTONE DESCRIPTION	DATE COMPLETED
1	DELIVERY OF GAS PERMEABLE AGGREGATE TO THE SITE.	
2	SUB-MEMBRANE DEPRESSURIZATION PIPING INSTALLATION PROGRESS, AT A MINIMUM, 25% COMPLETENESS.	
3	SUB-MEMBRANE DEPRESSURIZATION PIPING INSTALLATION PROGRESS, AT A MINIMUM, 50% COMPLETENESS.	
4	SUB-MEMBRANE DEPRESSURIZATION PIPING INSTALLATION PROGRESS, AT A MINIMUM, 75% COMPLETENESS.	
5	SUB-MEMBRANE DEPRESSURIZATION PIPING INSTALLATION PROGRESS, AT A MINIMUM, 100% COMPLETENESS.	
6	INSTALLATION OF VACUUM MONITORING POINTS (VMP).	
7	COMPLETION OF GAS PERMEABLE AGGREGATE LAYER.	
8	COMPLETION OF INSTALLATION OF ALL PORTIONS OF ABOVE-SLAB PIPING FROM THE RISER STUB-UP TO THE ROOF (INCLUDING LABELS ON EXPOSED PORTIONS OF THE ABOVE-SLAB RISER PIPING).	
9	PRESSURE TESTING OF COMPLETED INTERIOR PIPES.	
10	INSTALLATION OF BLOWERS/SUCTION FANS AND ACCESSORIES.	
11	INSTALLATION OF ALARM INDICATOR STATION (AIS) AND TESTING	
12	PLACEMENT OF FINISHED FLOOR SLAB.	
13	START-UP OF COMPLETED SYSTEM.	

CODE COMPLIANCE NOTES

1. THE SMD SYSTEM COMPLIES WITH THE REQUIREMENTS OF THE 2022 NYC MECHANICAL CODE, CHAPTER 5, SECTION 512, "SUB-SLAB SOIL EXHAUST SYSTEMS".
2. THE SMDS IS NOT A "HAZARDOUS EXHAUST SYSTEM", AS DEFINED IN THE 2022 NYC MECHANICAL CODE SECTION 510.
3. CHAPTER 6, "DUCT SYSTEMS", PARAGRAPH 601.4, "CONTAINMENT PREVENTION", OF THE 2022 NYC MECHANICAL CODE DOES NOT APPLY TO THE SMDS.
4. CHAPTER 6, "DUCT SYSTEMS", PARAGRAPH 607.5.5.2, "LIMITATIONS", OF THE 2022 NYC MECHANICAL CODE DOES NOT APPLY TO THE SMDS.
5. THE SMDS IS NOT DESIGNED TO VENT METHANE OR RADON.
6. THE CONTRACTOR SHALL OBTAIN "CERTIFICATE OF COMPLIANCE" REQUIRED IN ACCORDANCE WITH CHAPTER 1 OF TITLE 28 OF THE ADMINISTRATIVE CODE, ARTICLE 116, 28-116.4.1. CERTIFICATE OF COMPLIANCE SHALL BE REQUIRED FOR THE USE AND OPERATION OF THE SMDS.
7. PLEASE REFER TO NEW BUILDING APPLICATION DOB NOW JOB NUMBER B01017650-S6 FOR ALL BUILDING DEPARTMENT NOTES, APPLICABLE INSPECTIONS, AND LIST OF DRAWINGS.

PERMITS:
CONTRACTOR SHALL FILE FOR AND OBTAIN PERMITS FOR ALL MECHANICAL SYSTEMS. PERMITS SHALL COMPLY WITH CHAPTER 1 ADMINISTRATION, TITLE 28, SECTION MC 105.

LISTED AND LABELED:
ALL APPLIANCES REGULATED BY 2022 NYC MECHANICAL CODE SHALL BE LISTED AND LABELED AS REQUIRED BY CHAPTER 1, MC 301.7. LABEL INFORMATION SHALL COMPLY WITH REQUIREMENTS OF CHAPTER 1, MC 301.9.

VIBRATION ISOLATION:
ALL MECHANICAL EQUIPMENT SHALL BE MOUNTED AND SUPPORTED AND PROVIDED WITH VIBRATION ISOLATORS AS REQUIRED BY 2022 NYC MECHANICAL, CHAPTER 3, MC 313.3.

WIND RESISTANCE:
ALL MECHANICAL EQUIPMENT, APPLIANCES, AND SUPPORTS THAT ARE EXPOSED TO WIND SHALL BE DESIGNED AND INSTALLED AS PER 2022 NYC BUILDING CODE CHAPTER 16, SECTION BC 1609 "WIND LOADS".

FIRE STOPPING COMPLIANCE NOTE:
- FOR FIRE STOPPING AT ANY FIRE RATED CONSTRUCTION PENETRATION, CONTRACTOR SHALL REFER TO ARCHITECTURAL DRAWING SET (ARCHITECTURAL DRAWING A-501.00).
- ALL DUCT AND PIPE PENETRATIONS OF RATED CONSTRUCTION SHALL COMPLY WITH 2022 NYC BUILDING CODE, CHAPTER 7, SECTIONS BC 711 AND 714.

SUBMITTALS/DELIVERABLES

1. CONTRACTOR TO PROVIDE MANUFACTURER CUT SHEETS FOR ALL PROPOSED COMPONENTS OF THE SMD SYSTEM (INCLUDING BUT NOT LIMITED TO PVC VAPOR COLLECTION PIPING, PVC PIPE FITTINGS, 3/4-INCH CLEAN STONE, VAPOR BARRIER, METAL RISER PIPE, RISER PIPE FITTINGS SUB-SLAB VACUUM MONITORING POINTS, AND BLOWERS [IF REQUIRED]) BEFORE PROCUREMENT AND INSTALLATION.
2. CONTRACTOR TO PROVIDE DETAILED SHOP DRAWINGS TO THE EOR ENGINEER FOR REVIEW PRIOR TO INSTALLATION OF DEPRESSURIZATION SYSTEM COMPONENTS.
3. CONTRACTOR TO PROVIDE PROOF OF CERTIFICATION FOR VAPOR BARRIER INSTALLER AS A CONSTRUCTION SUBMITTAL FOR REVIEW.
4. CONTRACTOR MUST PROVIDE PE-STAMPED AS-BUILT DRAWINGS OF COMPLETED VAPOR BARRIER EXTENTS TO EOR ENGINEER FOLLOWING INSTALLATION.
5. CONTRACTOR MUST PROVIDE PE-STAMPED AS-BUILT DRAWINGS OF UNDER-SLAB AND ABOVE-SLAB SMD SYSTEM COMPONENTS TO EOR ENGINEER FOLLOWING INSTALLATION.
6. THE SUBSURFACE SYSTEM COMPONENTS (E.G, PIPES) SHALL BE SURVEYED BY A NYS LICENSED SURVEYOR

PROGRESS INSPECTIONS

PROGRESS INSPECTIONS REQUIRED UNDER CHAPTER 1 OF THE NYC BUILDING CODE AND THE APPLICABLE SECTIONS OF THE NYC CONSTRUCTION CODE ARE LISTED IN THE FOLLOWING TABLES.

THE CONTRACTOR MUST NOTIFY THE RELEVANT SPECIAL INSPECTOR OR SPECIAL INSPECTION AGENCY IN WRITING FOR SPECIAL INSPECTIONS AT LEAST 72 HOURS BEFORE THE SPECIFIC WORK COMMENCES.

THE "OWNER" SHALL BE RESPONSIBLE FOR THE FOLLOWING PROGRESS INSPECTIONS:

ENERGY CODE COMPLIANCE INSPECTIONS * TR8	BC 110.3.5
FINAL	BC 110.5 28-116.2.4.2 1 RCNY 101-10

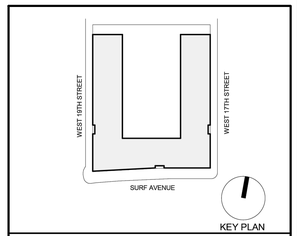
SPECIAL INSPECTIONS

SPECIAL INSPECTIONS REQUIRED UNDER THIS APPLICATION IN ACCORDANCE WITH CHAPTER 17 AND THE APPLICABLE SECTIONS OF THE NEW YORK CITY CONSTRUCTION CODE ARE LISTED IN THE FOLLOWING TABLES. SPECIAL INSPECTIONS FOR PORTIONS OF THE WORK THAT ARE FILED UNDER SEPARATE APPLICATION ARE NOT LISTED HERE AND ARE TO BE LISTED ON THOSE APPLICATIONS BY THE CONTRACTOR'S APPLICANT OF RECORD.

THE CONTRACTOR MUST NOTIFY THE RELEVANT SPECIAL INSPECTOR OR SPECIAL INSPECTION AGENCY IN WRITING FOR SPECIAL INSPECTIONS AT LEAST 72 HOURS BEFORE THE SPECIFIC WORK COMMENCES.

THE "OWNER" SHALL BE RESPONSIBLE FOR THE FOLLOWING SPECIAL INSPECTIONS:

MECHANICAL SYSTEMS	BC 1705.21
FIRE-RESISTANT PENETRATIONS AND JOINTS	BC 1705.17
POST-INSTALLED ANCHORS (BB# 2022-014)	BC 1705.37



PROJECT LOCATION MAP

SCALE: NOT TO SCALE

SOURCE:
CONEY ISLAND – PHASE 3 – 100%CD SUBMISSION

PROJECT NO. 170747001

LANGAN

DOB JOB NUMBER: B00917292-S9

Date	Description	No.
12/05/2025	PAA SUBMISSION	1

REVISIONS

SIGNATURE DATE SIGNED

JASON J. HAYES, P.E.
NEW YORK LICENSE NO. 089491

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Project

1709 SURF AVENUE

BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS NEW YORK

Drawing Title

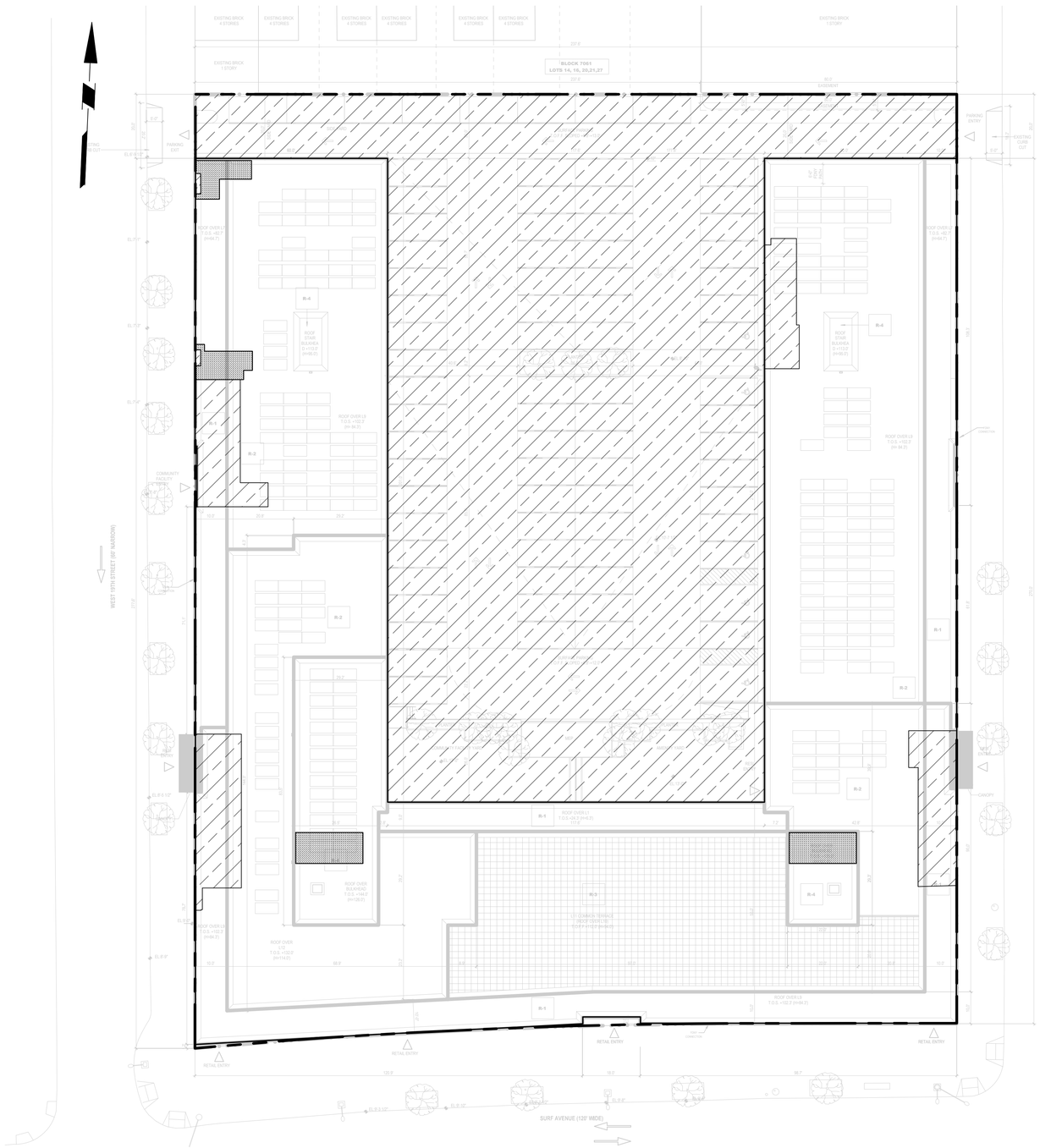
SUB-MEMBRANE DEPRESSURIZATION SYSTEM NOTES

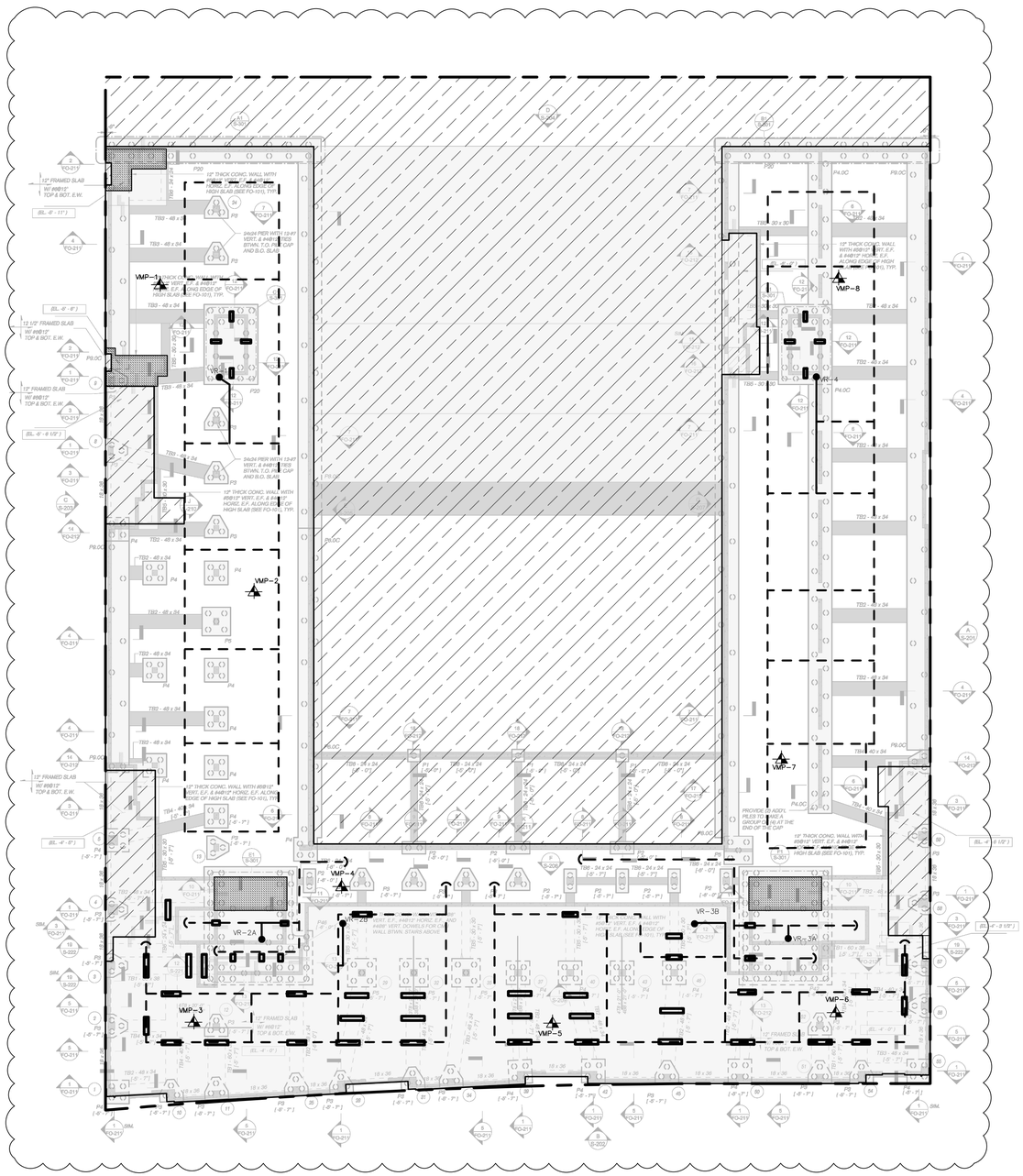
Project No.	Drawing No.
170747001	H-001.00
Date: 03/13/2025	
Drawn By: VK	
Checked By: LH	Sheet 1 of 9

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

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Filename: \\Langan.com\data\NYC\data0\170747001\Project Data\CAD\01\SheetFiles\Environmental\SSDS Design - PAA\170747001- 1706 Surf Ave - SSDS.dwg Date: 12/2/2025 Time: 17:51 User: vkanagaratnam Style Table: Langan.stb Layout: H-001.00

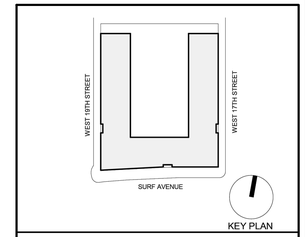

BLOCK 7061
LOTS 14, 16, 20,21,27
EXISTING BRICK 4 STORIES
EXISTING BRICK 1 STORY
R-1
R-2
R-3
R-4
ROOF OVER L.T. T.O.S.=152.2' (H=114.0')
ROOF OVER BULKHEAD T.O.S.=144.0' (H=26.0')
ROOF OVER L.T. T.O.S.=26.2' (H=8.3')
ROOF OVER L.T. T.O.S.=152.2' (H=114.0



1 FOUNDATION PLAN
H-101 SCALE: 1" = 20'

LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE BUILDING EXTENT
- VMP-1 VACUUM MONITORING POINT LOCATION
- SMDS 4-INCH Ø SOLID PVC UNDERGROUND PIPING
- SMDS 4-INCH Ø PERFORATED PVC UNDERGROUND PIPING
- SMDS 4-INCH Ø PERFORATED PVC PIPING CAPPED AT END
- SMDS METAL PIPE SLEEVE THROUGH FOUNDATION ELEMENT
- VR-1 4-INCH Ø RISER PIPE PENETRATION THROUGH GROUND FLOOR SLAB
- OPEN AIR SPACE
- NON-DEPRESSURIZED AREA



PROJECT LOCATION MAP
SCALE: NOT TO SCALE

SOURCE:
CONEY ISLAND – PHASE 3 – 100%CD SUBMISSION

NOTES:

1. ALL LOCATIONS ARE APPROXIMATE
2. SMDS = SUB-MEMBRANE DEPRESSURIZATION SYSTEM
3. PVC = POLYVINYL CHLORIDE
4. BACKGROUND ADAPTED FROM 100% CD SUBMISSION SET, FOUNDATION AND LOW GROUND FLOOR FRAMING PLAN FO-101.00, DATED APRIL 08, 2024, PROVIDED BY SEVERUD ASSOCIATES.
5. ELEVATIONS ARE REFERENCED TO FLOOR DATUM ELEVATION WHICH IS SET TO +13'-0" (DESIGN FLOOD ELEVATION) RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AS ESTABLISHED AND MAINTAINED BY NATIONAL GEODETIC SURVEY OF THE NATIONAL OCEAN SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION OR SUCCESSOR AGENCY.

VACUUM MONITORING POINT SCHEDULE

No.	VACUUM MONITORING POINT ID	SYSTEM	LOCATION
1	VMP-1	SYSTEM 1	COMMUNITY FACILITY
2	VMP-2	SYSTEM 1	COMMUNITY FACILITY
3	VMP-3	SYSTEM 2	RETAIL D
4	VMP-4	SYSTEM 2	MAIL ROOM
5	VMP-5	SYSTEM 3	RETAIL B
6	VMP-6	SYSTEM 3	RETAIL A
7	VMP-7	SYSTEM 4	PACKAGE ROOM
8	VMP-8	SYSTEM 4	WATER METER/ FIRE PUMP ROOM

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DOB JOB NUMBER: B00917292-S9

Date	Description	No.
12/05/2025	PAA SUBMISSION	1

REVISIONS

SIGNATURE DATE SIGNED
JASON J. HAYES, P.E.
NEW YORK LICENSE NO. 089491

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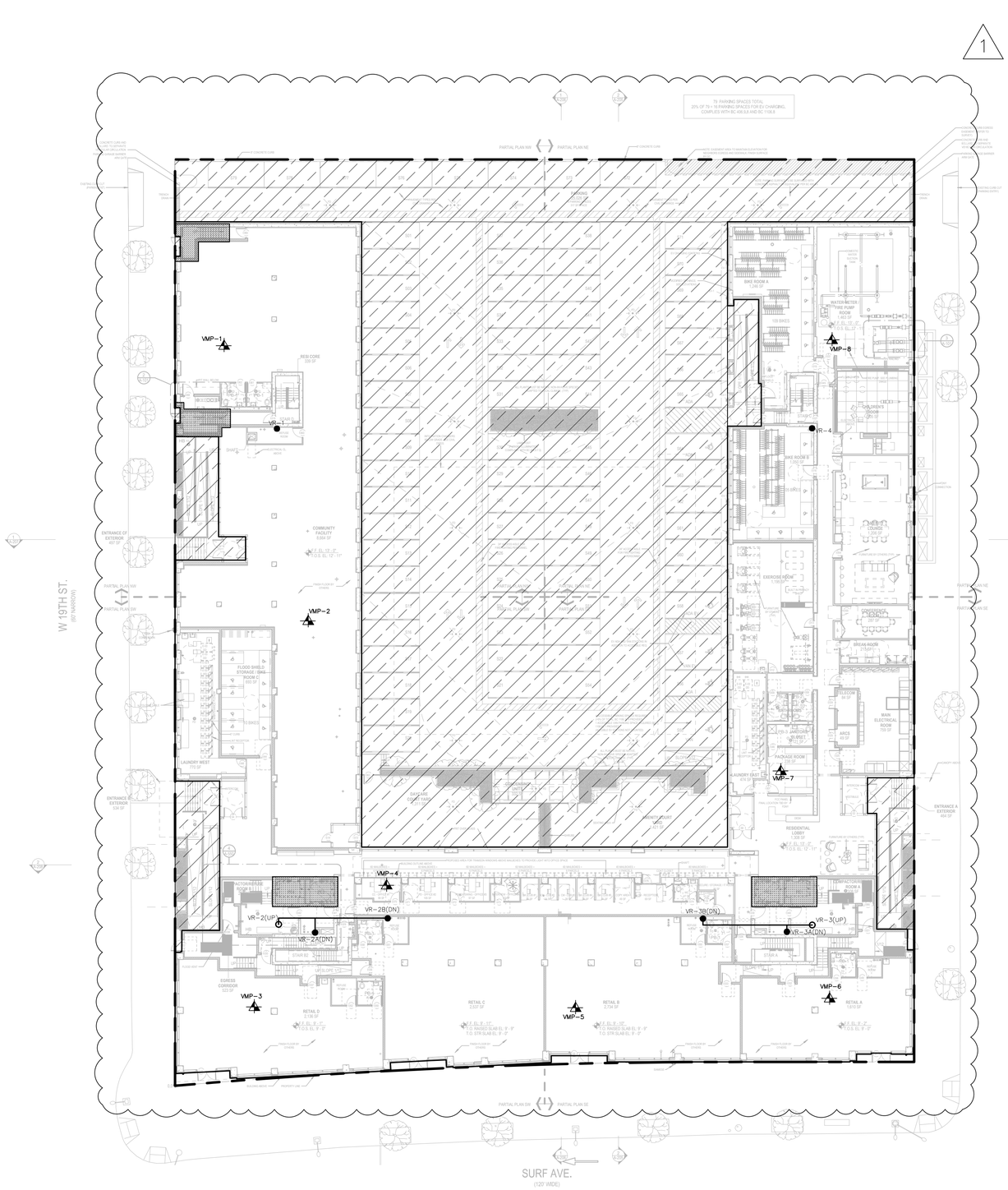
Project
1709 SURF AVENUE
BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS NEW YORK

Drawing Title
SUB-MEMBRANE DEPRESSURIZATION SYSTEM PLAN

Project No.	Drawing No.
170747001	H-101.00
Date: 03/13/2025	
Drawn By: VK	
Checked By: LH	Sheet 3 of 9

PROJECT NO. 170747001 LANGAN

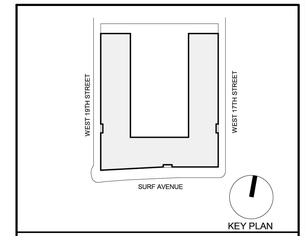
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1 H-102 ARCHITECTURAL PLAN
SCALE: 1" = 20'

LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE BUILDING EXTENT
- VMP–1 VACUUM MONITORING POINT LOCATION
- VR–1 4-INCH Ø METAL RISER PIPE PENETRATION THROUGH GROUND FLOOR SLAB
- 4-INCH Ø METAL RISER PIPE WITH A MINIMUM 1% SLOPE
- UP DN RISER PIPE OFFSET
- OPEN AIR SPACE
- NON-DEPRESSURIZED AREA



PROJECT LOCATION MAP
SCALE: NOT TO SCALE

SOURCE:
CONEY ISLAND – PHASE 3 – 100%CD SUBMISSION

NOTES:

1. ALL LOCATIONS ARE APPROXIMATE
2. SMDS = SUB-MEMBRANE DEPRESSURIZATION SYSTEM
3. BACKGROUND ADAPTED FROM 100% CD SUBMISSION SET, OVERALL FLOOR PLAN - LEVEL 01, A-101.00, DATED APRIL 02, 2024, PROVIDED BY S9 ARCHITECTURE.
4. RISER PIPE SLAB PENETRATIONS LABELED AS "DN" INDICATE LOCATIONS WHERE THE RISER PIPE IS PENETRATING THE LOWER FLOOR SLAB AND CONNECTING TO SUB-SURFACE VAPOR COLLECTION PIPE.
5. RISER PIPE SLAB PENETRATIONS LABELED AS "UP" INDICATE LOCATIONS WHERE THE RISER PIPE IS PENETRATING THE UPPER FLOOR SLAB.
6. ELEVATIONS ARE REFERENCED TO FLOOR DATUM ELEVATION WHICH IS SET TO +13'-0" (DESIGN FLOOD ELEVATION) RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AS ESTABLISHED AND MAINTAINED BY NATIONAL GEODETIC SURVEY OF THE NATIONAL OCEAN SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION OR SUCCESSOR AGENCY.
7. PIPE AND EQUIPMENT ARRANGEMENT SHOWN FOR SCHEMATIC PURPOSES ONLY. CONTRACTOR TO SUBMIT TO-SCALE DRAWING SHOWING PROPOSED ARRANGEMENT. CONTRACTOR IS REQUIRED TO OBTAIN APPROVAL OF ARRANGEMENT.
8. REFER TO H-103.00 FOR PIPE AND EQUIPMENT ARRANGEMENT DETAILS (NOT TO SCALE). NOTE THAT NOT ALL ACCESSORIES ARE SHOWN.

VACUUM MONITORING POINT SCHEDULE

No.	VACUUM MONITORING POINT ID	SYSTEM	LOCATION
1	VMP-1	SYSTEM 1	COMMUNITY FACILITY
2	VMP-2	SYSTEM 1	COMMUNITY FACILITY
3	VMP-3	SYSTEM 2	RETAIL D
4	VMP-4	SYSTEM 2	MAIL ROOM
5	VMP-5	SYSTEM 3	RETAIL B
6	VMP-6	SYSTEM 3	RETAIL A
7	VMP-7	SYSTEM 4	PACKAGE ROOM
8	VMP-8	SYSTEM 4	WATER METER/ FIRE PUMP ROOM

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DOB JOB NUMBER: B00917292–S9

Date	Description	No.
12/05/2025	PAA SUBMISSION	1

REVISIONS

SIGNATURE DATE SIGNED
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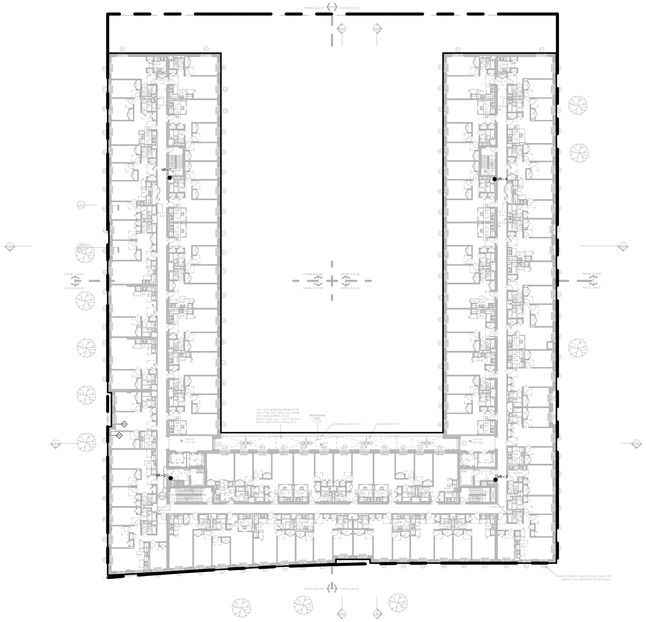
Project
1709 SURF AVENUE
BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS NEW YORK

Drawing Title
SUB-MEMBRANE DEPRESSURIZATION SYSTEM RISER PLAN (LEVEL 01)

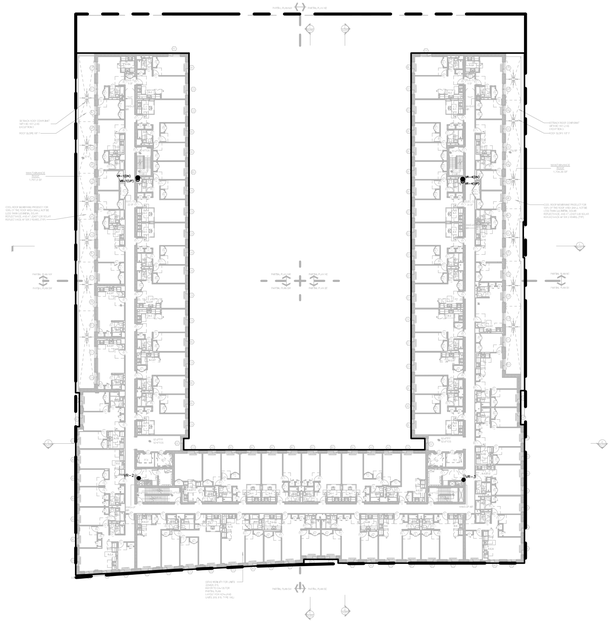
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Date: 03/13/2025	
Drawn By: VK	
Checked By: LH	Sheet 4 of 9

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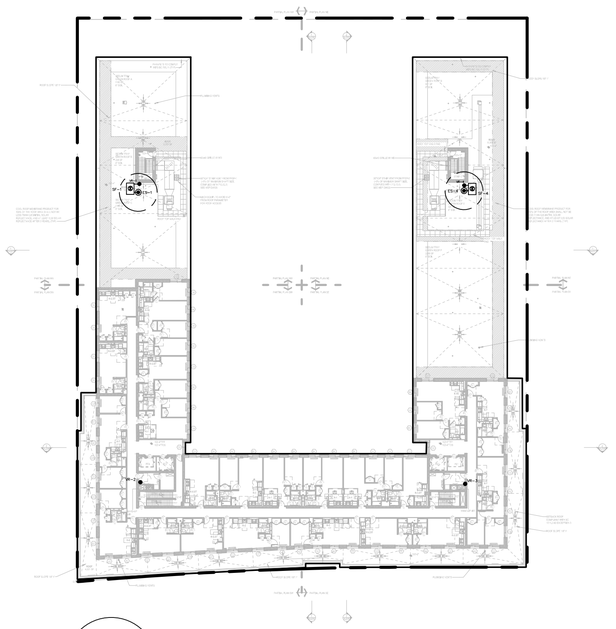
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PROJECT NO. 170747001



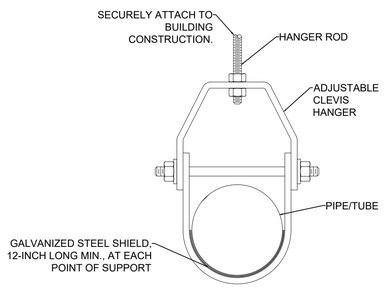
1 H-103 OVERALL FLOOR PLAN: FLOORS 2-7
SCALE: 1" = 40'



2 H-103 OVERALL FLOOR PLAN: FLOORS 8-9
SCALE: 1" = 40'

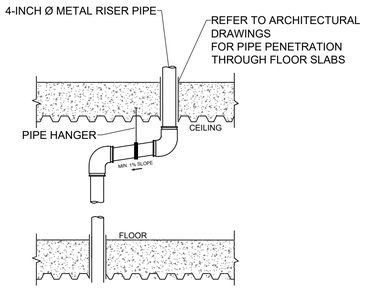


3 H-103 OVERALL FLOOR PLAN: FLOOR 10
SCALE: 1" = 40'



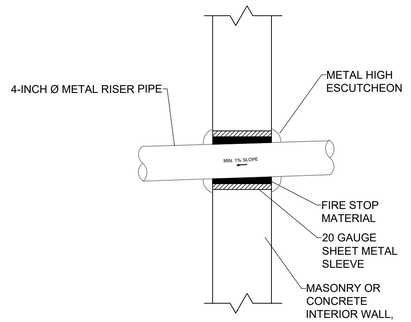
NOTE: INSTALL AS PER PLUMBING DRAWINGS AND DIVISION 15 SPECIFICATIONS.

4 H-103 TYPICAL PIPE SUPPORT
SCALE: N.T.S.



NOTE: EXTEND RISER FROM THE FLOOR PENETRATION TO CEILING. INSTALL HORIZONTAL PIPING BENEATH CEILING AT 1% SLOPE TOWARD SUBSURFACE PIPE.

5 H-103 TYPICAL RISER PIPE OFFSET
SCALE: N.T.S.

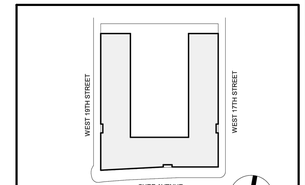


NOTE: INSTALL AS PER PLUMBING DRAWINGS AND DIVISION 15 SPECIFICATIONS, AND PROJECT FIRESTOPPING/SMOKE SEALS REQUIREMENTS.

6 H-103 PIPE PENETRATION AT INTERIOR FLOOR/WALL/CEILING
SCALE: N.T.S.

LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE BUILDING EXTENT
- 4-INCH Ø METAL RISER PIPE
- VR-1 — 4-INCH Ø METAL RISER PIPE PENETRATION THROUGH LOWER FLOOR SLAB
- SF-1 — SUCTION FAN
- UP / DN — VERTICAL RISER OFFSET
- ES-1 — EXHAUST STACK
- BUILDING AIR INTAKE LOCATION 10-FOOT RADIUS



PROJECT LOCATION MAP
SCALE: NOT TO SCALE

SOURCE:
CONEY ISLAND – PHASE 3 – 100%CD SUBMISSION

NOTES:

1. ALL LOCATIONS ARE APPROXIMATE.
2. N.T.S. = NOT TO SCALE
3. REFER TO DRAWING H-105.00 FOR SMDS EQUIPMENT SCHEDULE, GENERAL NOTES, AND BLOWER NOTES.
4. NOT ALL REQUIRED ACCESSORIES ARE SHOWN.
5. BACKGROUNDS ADAPTED FROM 100% CD SUBMISSION SET, OVERALL FLOOR PLAN - LEVEL 02-07, A-102.00, OVERALL FLOOR PLAN - LEVEL 08-09, A-103.00, OVERALL FLOOR PLAN - LEVEL 10, A-104.00, DATED APRIL 02, 2024, PROVIDED BY S9 ARCHITECTURE.
6. RISER PIPE SLAB PENETRATIONS LABELED AS "DN" INDICATE LOCATIONS WHERE THE RISER PIPE IS PENETRATING THE LOWER FLOOR SLAB.
7. RISER PIPE SLAB PENETRATIONS LABELED AS "UP" INDICATE LOCATIONS WHERE THE RISER PIPE IS PENETRATING THE UPPER FLOOR SLAB.

DOB JOB NUMBER: B00017252-33

Date	Description	No.
12/05/2025	PAA SUBMISSION	1

REVISIONS

SIGNATURE DATE SIGNED
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Project
1709 SURF AVENUE
BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS NEW YORK

Drawing Title
SUB-MEMBRANE DEPRESSURIZATION SYSTEM RISER PLAN AND DETAILS (LEVEL 2-10)

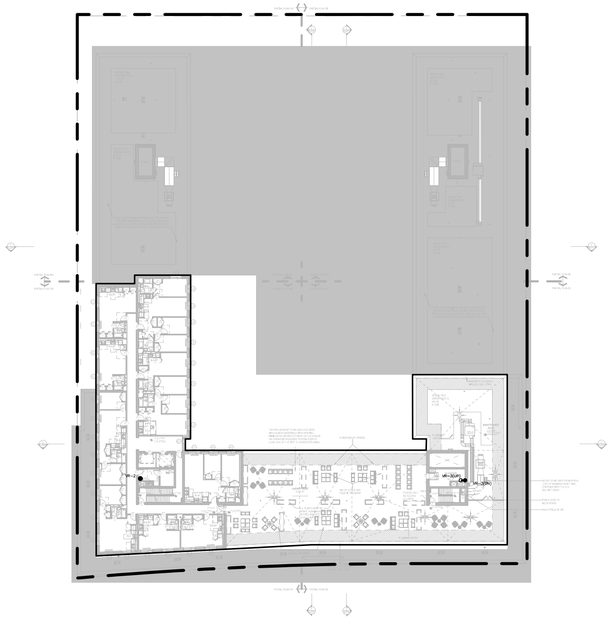
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Date: 03/13/2025	
Drawn By: VK	
Checked By: LH	Sheet 5 of 9

PROJECT NO. 170747001

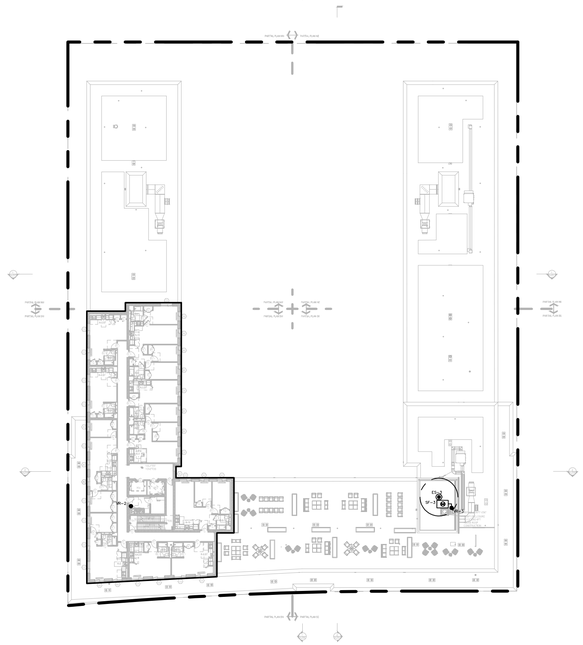
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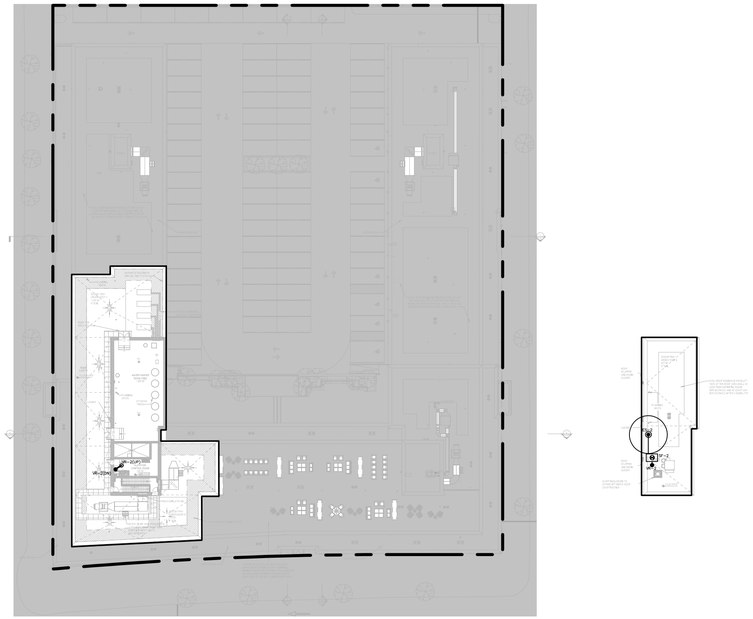
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1 H-104 OVERALL FLOOR PLAN: FLOOR 11
SCALE: 1" = 40'



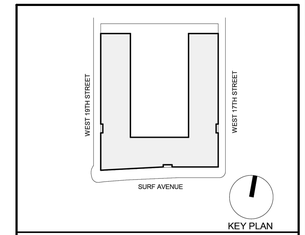
2 H-104 OVERALL FLOOR PLAN: FLOOR 12
SCALE: 1" = 40'



3 H-104 OVERALL FLOOR PLAN: ROOF AND BULKHEAD B
SCALE: 1" = 40'

LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE BUILDING EXTENT
- 4-INCH Ø METAL RISER PIPE
- VR-1 — 4-INCH Ø METAL RISER PIPE PENETRATION THROUGH LOWER FLOOR SLAB
- SF-1 — SUCTION FAN
- UP / DN — VERTICAL RISER OFFSET
- ES-1 — EXHAUST STACK
- BUILDING AIR INTAKE LOCATION 10-FOOT RADIUS



KEY PLAN

PROJECT LOCATION MAP
SCALE: NOT TO SCALE

SOURCE:
CONEY ISLAND – PHASE 3 – 100%CD SUBMISSION

NOTES:

1. ALL LOCATIONS ARE APPROXIMATE
2. BACKGROUNDS ADAPTED FROM 100% CD SUBMISSION SET, OVERALL FLOOR PLAN - LEVEL 11, A-105.00, OVERALL FLOOR PLAN - LEVEL 12, A-106.00, OVERALL FLOOR PLAN - ROOF, A-107.00, DATED APRIL 02, 2024, PROVIDED BY S9 ARCHITECTURE.
3. RISER PIPE SLAB PENETRATIONS LABELED AS "DN" INDICATE LOCATIONS WHERE THE RISER PIPE IS PENETRATING THE LOWER FLOOR SLAB.
4. RISER PIPE SLAB PENETRATIONS LABELED AS "UP" INDICATE LOCATIONS WHERE THE RISER PIPE IS PENETRATING THE UPPER FLOOR SLAB.
5. PIPE AND EQUIPMENT ARRANGEMENT SHOWN FOR SCHEMATIC PURPOSES ONLY. CONTRACTOR TO SUBMIT TO-SCALE DRAWING SHOWING PROPOSED ARRANGEMENT. CONTRACTOR IS REQUIRED TO OBTAIN APPROVAL OF ARRANGEMENT.
6. REFER TO H-103.00 FOR PIPE AND EQUIPMENT ARRANGEMENT DETAILS (NOT TO SCALE). NOTE THAT NOT ALL ACCESSORIES ARE SHOWN.
7. REFER TO DRAWING H-105.00 FOR SMDS EQUIPMENT SCHEDULE, GENERAL NOTES, AND BLOWER NOTES.

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

DOB JOB NUMBER: B00917292-S9

Date	Description	No.
12/05/2025	PAA SUBMISSION	1

REVISIONS

SIGNATURE DATE SIGNED
JASON J. HAYES, P.E.
NEW YORK LICENSE NO. 089491

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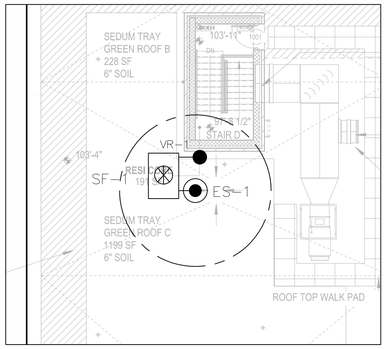
Project
1709 SURF AVENUE
BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS NEW YORK

Drawing Title
SUB-MEMBRANE DEPRESSURIZATION SYSTEM RISER PLAN (LEVEL 11-ROOF)

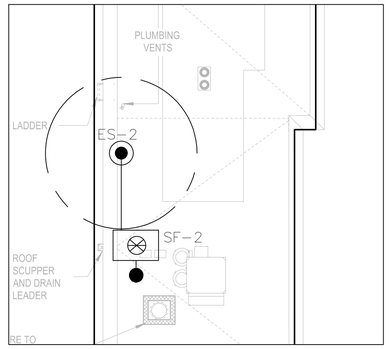
Project No.	Drawing No.
170747001	H-104.00
Date: 03/13/2025	
Drawn By: VK	
Checked By: LH	Sheet 6 of 9

PROJECT NO. 170747001

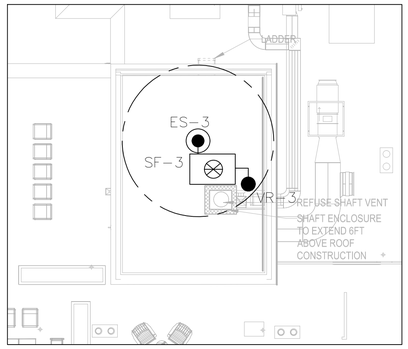
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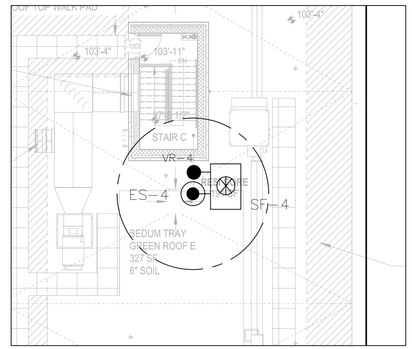
1 H-105 OVERALL FLOOR PLAN: FLOOR 10
SCALE: 1" = 10'



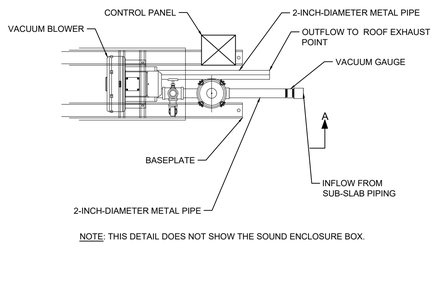
2 H-105 OVERALL FLOOR PLAN: ROOF
SCALE: 1" = 10'



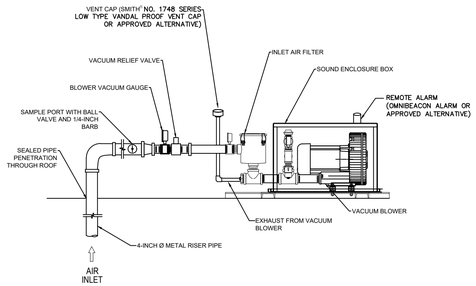
3 H-105 OVERALL FLOOR PLAN: FLOOR 12
SCALE: 1" = 10'

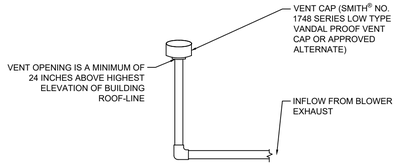


4 H-105 OVERALL FLOOR PLAN: FLOOR 10
SCALE: 1" = 10'



NOTE: THIS DETAIL DOES NOT SHOW THE SOUND ENCLOSURE BOX.





5 H-105 TYPICAL BLOWER LAYOUT (PLAN VIEW)
SCALE: N.T.S.

6 H-105 TYPICAL BLOWER LAYOUT (SECTION VIEW)
SCALE: N.T.S.

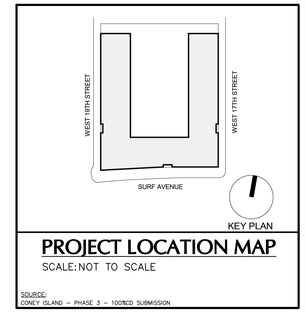
7 H-105 TYPICAL EXHAUST POINT
SCALE: N.T.S.

FAN SCHEDULE

UNIT NO.	AREAS SERVED	SERVICE	LOCATION	MOTOR SIZE	MIN. CFM	MIN. RATE (INCHES WC)	MOTOR REQUIREMENTS			MANUFACTURER/MODEL
SF-1	WEST AREAS (FIRST FLOOR)	SMDS	10TH FLOOR ROOF WEST TOWER	1.11 HP(3.75/2.15 AMPS)	37	12.0000	3 PHASE	60 HZ	220-250/415-460 VOLTS	AIRTECH 3BA1310-7AT26
SF-2	SOUTH AREAS (FIRST FLOOR)	SMDS	ROOF OVER BULKHEAD B	0.39 HP(1.74/1.0 AMPS)	23	11.0000	3 PHASE	60 HZ	220-250/415-460 VOLTS	AIRTECH 3BA1300-7AT06
SF-3	SOUTH AREAS (FIRST FLOOR)	SMDS	ROOF OVER BULKHEAD A	0.39 HP(1.74/1.0 AMPS)	27	11.0000	3 PHASE	60 HZ	220-250/415-460 VOLTS	AIRTECH 3BA1300-7AT06
SF-4	EAST AREAS (FIRST FLOOR)	SMDS	10TH FLOOR ROOF EAST TOWER	1.11 HP(3.75/2.15 AMPS)	39	12.0000	3 PHASE	60 HZ	220-250/415-460 VOLTS	AIRTECH 3BA1310-7AT26

INSTRUMENT SCHEDULE

ITEM	DESCRIPTION	SERVICE	AREAS SERVICED	LOCATION	REQUIREMENTS	RANGE	REMARKS	MANUFACTURER/MODEL
PI-101	VACUUM GAUGE	SMDS	SYSTEMS 1 - 4	BLOWER INLET	N/A	SEE VACUUM GAUGE SCHEDULE	N/A	WIKA TYPE 611.10
AIS-1	ALARM INDICATOR STATION	SMDS	SYSTEMS 1 - 4	TO BE DETERMINED	1 PHASE, 60 HZ, 24 VAC	N/A	CONNECT TO PRESSURE SWITCH	KELE RAD-1
PS-101	DIFFERENTIAL PRESSURE SWITCH	AIS	SYSTEMS 1 - 4	BLOWER INLET	N/A	0.4-1.6" WC	CONNECT TO AIS FOR BLOWER ASSEMBLY	DWEYER INSTRUMENTS SERIES 1900, MODEL 1910-1
ENV VFD-1	VARIABLE FREQUENCY DRIVE	SMDS FAN	SYSTEMS 1 - 4	TO BE DETERMINED	3 PHASE, 60 HZ, 208 VAC	0-60 HZ	COORDINATE LOCATION WITH ARCHITECT	WEG EDP11S007DN3R10000
FAN SILENCER	SILENCER	SMDS FAN	SYSTEMS 1 - 4	TO BE DETERMINED	N/A	N/A	CONNECT TO FAN OUTLET	dB NOISE REDUCTION, 213-005086



PROJECT LOCATION MAP
SCALE: NOT TO SCALE

SOURCE:
CONEY ISLAND – PHASE 3 – 100%CD SUBMISSION

LEGEND:

- 4-INCH Ø METAL RISER PIPE
- VR-1 — 4-INCH Ø METAL RISER PIPE PENETRATION THROUGH LOWER FLOOR SLAB
- SF-1 — SUCTION FAN
- ES-1 — EXHAUST STACK
- BUILDING AIR INTAKE LOCATION 10-FOOT RADIUS

GENERAL NOTES:

1. ALL LOCATIONS ARE APPROXIMATE
2. NOT ALL REQUIRED ACCESSORIES ARE SHOWN.
3. BACKGROUNDS ADAPTED FROM 100% CD SUBMISSION SET, OVERALL FLOOR PLAN - LEVEL 10, A-104.00, OVERALL FLOOR PLAN - LEVEL 12, A-106.00, OVERALL FLOOR PLAN - ROOF, A-107.00, DATED APRIL 02, 2024, PROVIDED BY S9 ARCHITECTURE.
4. PIPE AND EQUIPMENT ARRANGEMENT SHOWN FOR SCHEMATIC PURPOSES ONLY (NOT TO SCALE). CONTRACTOR TO SUBMIT TO-SCALE DRAWING SHOWING PROPOSED ARRANGEMENT. CONTRACTOR IS REQUIRED TO OBTAIN APPROVAL OF ARRANGEMENT.
5. PROVIDE SHOP DRAWINGS FOR BLOWER AND ACCESSORY LAYOUT AND EXHAUST STACK MOUNTING.
6. EXTENSION OF THE SMDS PIPING MUST BE COORDINATED WITH STRUCTURAL ENGINEERS AND ARCHITECTS IN ACCORDANCE WITH ALL APPLICABLE BUILDING CODES
7. PROVIDE LIGHTNING ROD AND GROUNDING WIRE AS PER ELECTRICAL REQUIREMENTS, ELECTRICAL WIRING AND EQUIPMENT NOT SHOWN. REFER TO ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR REQUIREMENTS.
4. EXHAUST STACK CONFIGURATION, HEIGHT, AND STRUCTURAL SUPPORT WILL BE DESIGNED BY OTHERS, IF NECESSARY.
5. EXHAUST STACK MUST BE A MINIMUM OF 2 FEET ABOVE THE FINISHED ROOF FLOOR, MINIMUM 10 FEET ABOVE GROUND LEVEL, MINIMUM 10 FEET AWAY FROM ANY OPENING THAT IS LESS THAN 2 FEET BELOW THE EXHAUST POINT, AND MINIMUM 10 FEET FROM ADJOINING OR ADJACENT BUILDINGS, OPERABLE WINDOWS, HEATING VENTILATION AND AIR CONDITIONING (HVAC) INTAKES, SUPPLY REGISTERS , OR ANY OTHER INLETS.
6. INSTALL RAIN GUARD OR CAP ON THE EXHAUST POINT.

FAN NOTES:

1. THE SUCTION FAN SCHEMATICS AND DETAILS ARE SHOWN TO ILLUSTRATE THE REQUIRED COMPONENTS AND THE GENERAL LOCATIONS IN THE PIPING RUN AND SHALL NOT BE CONSIDERED ACCURATE. THE ACTUAL CONFIGURATION AND DIMENSIONS OF THE SUCTION FAN ASSEMBLY WILL VARY BASED ON MANUFACTURING METHODS AND FIELD CONDITIONS. FINAL DESIGN AND SUCTION FAN SYSTEM SELECTED SHALL BE DETAILED IN SUBMISSIONS TO THE ENGINEER AND ARE SUBJECT TO APPROVAL. CONTRACTOR SHALL PROVIDE ALL SUCTION FAN SPECIFICATIONS AND CUT SHEETS TO THE ENGINEER FOR APPROVAL PRIOR TO INSTALLATION.
2. BLOWERS MUST BE EXPLOSION PROOF AND HOUSED IN A CLASS I DIVISION II ENCLOSURE. BLOWERS MUST BE INSTALLED WITHIN THE ENCLOSURE BY THE BLOWER MANUFACTURER.
3. CONTRACTOR TO PROVIDE CONNECTION TO GROUNDING FOR ROOFTOP FAN. CONTRACTOR TO PROVIDE SOUND ENCLOSURE IF REQUIRED TO MEET NEW YORK CITY NOISE CODE AND/OR FURTHER ATTENUATE NOISE FOR NEARBY RESIDENTIAL UNITS. COORDINATE BLOWER SOUND AND/OR VIBRATION ATTENUATION REQUIREMENTS WITH ARCHITECT AND ACOUSTICAL CONSULTANT.
4. THE COMPOSITE BLOWER ASSEMBLY INCLUDING BLOWER, MOTOR, BASEPLATE, CONTROL PANEL, REMOTE VISUAL ALARM, VALVES, GAUGES, FILTER, AND FLEXIBLE HOSE SHALL BE PROVIDED BY THE MANUFACTURER.
5. BLOWER ASSEMBLY TO BE INSTALLED SHALL PROVIDE AT CONTINUOUS OPERATION OF A MINIMUM FLOW RATE AND VACUUM AT THE VACUUM BLOWER AS SPECIFIED IN THE FAN SCHEDULE.
6. THE BLOWER SCHEMATICS ARE SHOWN TO ILLUSTRATE THE REQUIRED COMPONENT AND THE GENERAL LOCATIONS IN THE PIPE RUN AND SHALL NOT BE CONSIDERED TO BE ACCURATE. THE ACTUAL CONFIGURATION AND DIMENSIONS OF THE BLOWER ASSEMBLY WILL VARY BASED ON MANUFACTURING METHODS AND FIELD CONDITIONS. FINAL DESIGN AND BLOWER SYSTEM SELECTED ARE SUBJECT TO APPROVAL BY THE ENGINEER. PROVIDE ALL BLOWER SPECIFICATIONS AND CUT SHEETS FOR COMMISSION AND/OR CONSTRUCTION MANAGER'S APPROVAL PRIOR TO INSTALLATION.
7. THE ELECTRICAL PANEL FOR THE BLOWERS SHALL INCLUDE AN AUXILIARY CONTACT FOR THE REMOTE ALARM AND WILL BE MOUNTED ON THE EXTERIOR OF THE SOUND ENCLOSURE. THE REMOTE ALARM SHALL BE LOCATED WITHIN THE BUILDING AND SHALL BE EASILY ACCESSIBLE. THE ALARM SHALL CONSIST OF A WARNING LIGHT AND ASSOCIATED RELAYS. THE REMOTE ALARM AND CONTROL PANEL SHALL BE CONFIGURED SUCH THAT IF THE BLOWER STOPS OPERATING, THE REMOTE ALARM WILL BE ACTIVATED. ALTERNATIVELY, IF A BUILDING MANAGEMENT SYSTEM IS TO BE INSTALLED, THE REMOTE ALARM WILL CAN BE CONFIGURED THROUGH THIS SYSTEM. A 120V ELECTRICAL SUPPLY SHALL BE PROVIDED TO THE REMOTE ALARM (REFER TO MEP DRAWINGS FOR DESIGN OF ELECTRICAL ITEMS).
8. THE REMOTE VISUAL ALARM SHALL BE LABELED AS FOLLOWS (REFER TO MEP DRAWINGS FOR DESIGN OF ELECTRICAL ITEMS):
   - SUB-SLAB VAPOR VENTING SYSTEM ALARM
   - BLOWER MALFUNCTION IF LIT
   - SERVICE BLOWER FAN IMMEDIATELY

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DOB JOB NUMBER: B00917292-S9		
Date	Description	No.
12/05/2025	PAA SUBMISSION	1

REVISIONS

SIGNATURE DATE SIGNED
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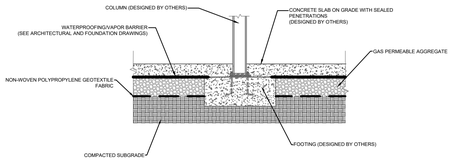
Project
1709 SURF AVENUE
BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS NEW YORK

Drawing Title
SUB-MEMBRANE DEPRESSURIZATION SYSTEM BLOWER PLAN AND DETAILS

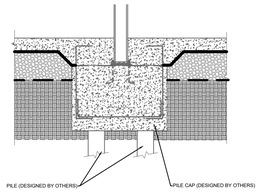
Project No.	Drawing No.
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Date: 03/13/2025	
Drawn By: VK	
Checked By: LH	Sheet 7 of 9

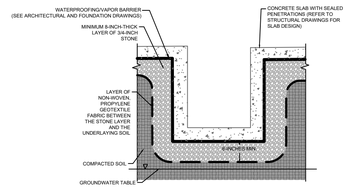
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PROJECT NO. 170747001

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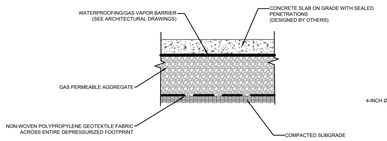


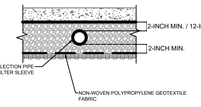
1 H-201 TYPICAL SECTION AT SUB-SLAB FOUNDATION ELEMENT
SCALE: N.T.S.



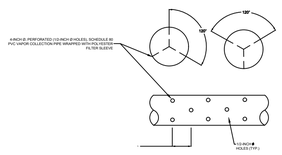


2 H-201 TYPICAL PIT IN DEPRESSURIZED AREA
SCALE: N.T.S.

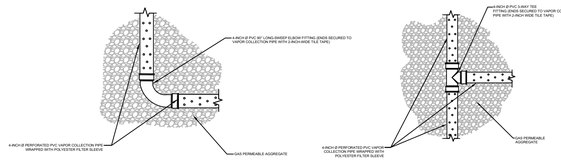




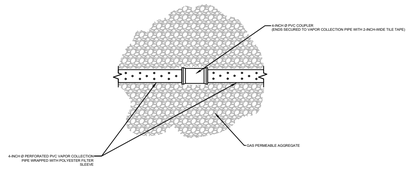
3 H-201 TYPICAL SECTION THROUGH SUB-SLAB
SCALE: N.T.S.



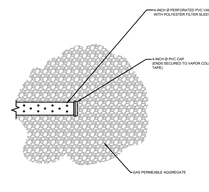
4 H-201 TYPICAL PERFORATION FOR VAPOR COLLECTION PIPE
SCALE: N.T.S.



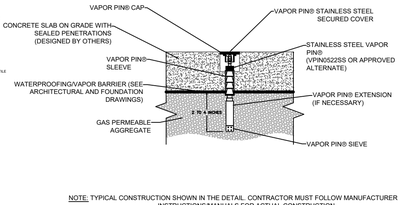
5 H-201 TYPICAL CONNECTOR FITTINGS FOR VAPOR COLLECTION PIPE
SCALE: N.T.S.



6 H-201 TYPICAL COUPLER FOR VAPOR COLLECTION PIPE
SCALE: N.T.S.

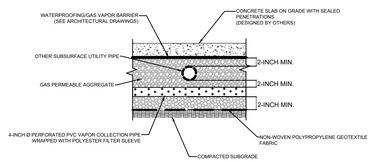


7 H-201 TYPICAL CAP TERMINATION FOR VAPOR COLLECTION PIPE
SCALE: N.T.S.



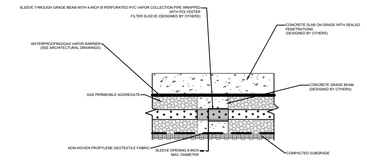
NOTE: TYPICAL CONSTRUCTION SHOWN IN THE DETAIL. CONTRACTOR MUST FOLLOW MANUFACTURER INSTRUCTIONS/MANUALS FOR ACTUAL CONSTRUCTION.

8 H-201 TYPICAL MONITORING POINT
SCALE: N.T.S.



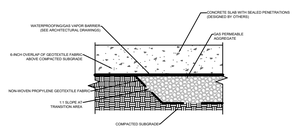
NOTE: ONLY APPLIES WHERE 4-INCH Ø PVC VAPOR COLLECTION PIPE DOES NOT FIT ABOVE UTILITY PIPE.

9 H-201 TYPICAL VAPOR COLLECTION PIPE CROSSING OTHER PIPE
SCALE: N.T.S.

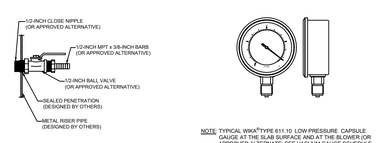


NOTE: COORDINATE PLACEMENT AND CONSTRUCTION OF SLEEVE THROUGH GRADE BEAM WITH STRUCTURAL ENGINEER.

10 H-201 TYPICAL SLEEVE THROUGH SUBSURFACE FOUNDATION ELEMENT
SCALE: N.T.S.

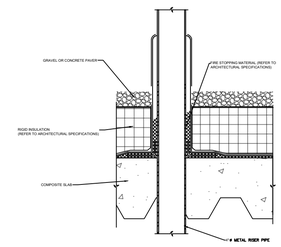


11 H-201 TYPICAL TRANSITION FROM DEPRESSURIZED AREA TO NON-DEPRESSURIZED AREA
SCALE: N.T.S.

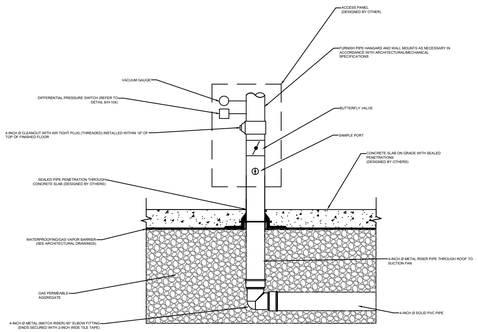


NOTE: TYPICAL WIKA® TYPE 611.10 LOW PRESSURE CAPSULE GAUGE AT THE SLAB SURFACE AND AT THE BLOWER (OR APPROVED ALTERNATE, SEE VACUUM GAUGE SCHEDULE FOR RANGES).

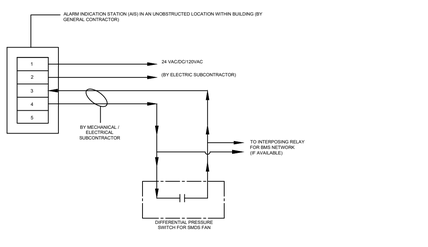
12 H-201 TYPICAL SAMPLE PORT AND VACUUM GAUGE
SCALE: N.T.S.



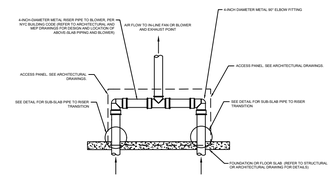
13 H-201 TYPICAL ROOF PENETRATION SUBSURFACE FOUNDATION ELEMENT
SCALE: N.T.S.



14 H-201 TYPICAL RISER SLAB PENETRATION
SCALE: N.T.S.



15 H-201 INTERCONNECTION SCHEMATIC OF DIFFERENTIAL PRESSURE SWITCH FOR SMDS FANS WITH AIS AND BMS NETWORK
SCALE: N.T.S.

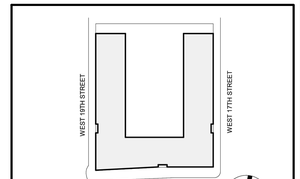


16 H-201 TYPICAL RISER MANIFOLD
SCALE: N.T.S.

NOTES:

1. REFER TO DRAWINGS H-101.00 THROUGH H-105.00 FOR SMDS PIPING, RISER, GAS PERMEABLE AGGREGATE, AND FAN AND EXHAUST STACK LOCATIONS, DETAILS, AND SECTIONS.
2. A DIFFERENTIAL PRESSURE SWITCH SHALL BE INSTALLED ON THE RISER PIPE BEFORE THE SUCTION FAN. THE DIFFERENTIAL PRESSURE SWITCH SHALL BE CONNECTED TO THE ALARM INDICATOR SYSTEM (AIS).
3. BMS = BUILDING MANAGEMENT SYSTEM

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PROJECT LOCATION MAP
SCALE: NOT TO SCALE

SOURCE:
CONEY ISLAND – PHASE 3 – 100%CD SUBMISSION

PROJECT NO. 170747001

DOB JOB NUMBER: B00917292-S9

Date	Description	No.
12/05/2025	PAA SUBMISSION	1

REVISIONS

SIGNATURE DATE SIGNED

JASON J. HAYES, P.E.
NEW YORK LICENSE NO. 089491

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
368 Ninth Avenue, 8th Floor
New York, NY 10001

T: 212.479.5400 F: 212.479.5444 www.langan.com

Project
1709 SURF AVENUE
BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS NEW YORK

Drawing Title
SUB-MEMBRANE DEPRESSURIZATION SYSTEM DETAILS

Project No.	Drawing No.
170747001	H-201.00
Date: 03/13/2025	
Drawn By: VK	
Checked By: LH	Sheet 8 of 9

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COMPLIANCE WITH NYCECC 2020

ITEM DESCRIPTION	CODE PRESCRIPTIVE VALUE & CITATION	PROPOSED DESIGN VALUE	SUPPORTING DOCUMENTATION
SUB-MEMBRANE DEPRESSURIZATION (SMD) SYSTEM	N/A	N/A	N/A

TO THE BEST OF MY KNOWLEDGE, BELIEF, AND PROFESSIONAL JUDGEMENT, ALL WORK UNDER THIS APPLICATION IS IN COMPLIANCE WITH 2020 NYCECC BY APPLICATION OF ASHRAE 90.1-2016 AS MODIFIED BY APPENDIX CA.

THE SUB-MEMBRANE DEPRESSURIZATION SYSTEM COMPLIES WITH THE REQUIREMENTS OF THE 2022 NYC MECHANICAL CODE SECTION 512, "SUBSLAB SOIL EXHAUST SYSTEMS" AND IS NOT SUBJECT TO THE ASHRAE 90.1, SECTION 6.5.3.1.1 REQUIREMENTS.

SUB-MEMBRANE DEPRESSURIZATION SYSTEMS ARE NOT ASSOCIATED WITH SYSTEMS PROVIDING HEATING OR COOLING CAPABILITY, AND DO NOT QUALIFY AS A REGULATED SYSTEM UNDER THE CRITERIA SET OUT PER ASHRAE 90.1, SECTION 6.5.3.1.1.

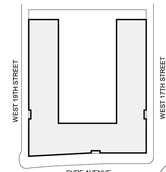
PER DEFINITION IN CODE SECTION 3.2 OF NEW YORK CITY ENERGY CODE 2020, SUB-MEMBRANE DEPRESSURIZATION SYSTEMS ARE CONSIDERED PROCESS ENERGY BECAUSE THEIR OPERATION SUPPORTS A PROCESS OTHER THAN CONDITIONING SPACES AND MAINTAINING COMFORT AND AMENITIES FOR THE BUILDING OCCUPANTS; SUB-MEMBRANE DEPRESSURIZATION SYSTEMS ARE THEREFORE NOT SUBJECT TO ASHRAE 90.1, SECTION 6.5.3.1.1 REQUIREMENTS.

ENERGY CODE PROGRESS INSPECTION

IID	INSPECTION/TEST	PERIODIC (MINIMUM)	REFERENCE STANDARD (SEE ECC CHAPTER C6) OR OTHER CRITERIA	ECC OR OTHER CITATION	INSPECTION DESCRIPTION
IDD1	MAINTENANCE INFORMATION	PRIOR TO SIGN-OFF OR ISSUANCE OF FINAL CERTIFICATE OF OCCUPANCY	APPROVED CONSTRUCTION DOCUMENTS, INCLUDING ELECTRICAL DRAWINGS WHERE APPLICABLE; ASHRAE GUIDELINE 4: PREPARATION OF OPERATING AND MAINTENANCE DOCUMENTATION FOR BUILDING SYSTEMS	ASHRAE 90.1 - 4.2.2.3, 6.7.2.2, 6.7.2.3.5.2, 8.7.2, 9.7.2.2, 9.4.3.2.2	MAINTENANCE MANUALS FOR MECHANICAL, SERVICE HOT WATER AND ELECTRICAL EQUIPMENT AND SYSTEMS REQUIRING PREVENTIVE MAINTENANCE MUST BE REVIEWED FOR APPLICABILITY TO INSTALLED EQUIPMENT AND SYSTEMS BEFORE SUCH MANUALS ARE PROVIDED TO THE OWNER. LABELS REQUIRED FOR SUCH EQUIPMENT OR SYSTEMS MUST BE INSPECTED FOR ACCURACY AND COMPLETENESS.

GENERAL NOTES

1. REFER TO THE ENERGY CODE SUBMISSIONS UNDER NEW BUILDING APPLICATION NO. B00917292-I1/S4/S5 FOR THE FULL ENERGY MODEL SUBMISSION FOR THE BUILDING.



KEY PLAN

PROJECT LOCATION MAP

SCALE: NOT TO SCALE

SOURCE:
CONEY ISLAND – PHASE 3 – 100%CD SUBMISSION

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

DOB JOB NUMBER: B00917292-S9

Date	Description	No.
12/05/2025	PAA SUBMISSION	1

REVISIONS

SIGNATURE DATE SIGNED

JASON J. HAYES, P.E.
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Project

1709 SURF AVENUE

BLOCK No. 7061, LOT Nos. 14, 16, 20, 21, & 27
CITY
KINGS **NEW YORK**

Drawing Title

ENERGY CODE COMPLIANCE

Project No.	Drawing No.
170747001	**EN-001.00**
Date: **03/13/2025**	
Drawn By: **VK**	
Checked By: **LH**	Sheet 9 of 9

PROJECT NO. 170747001

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To: Surf Ave Construction Team
Re: 1709 Surf Ave – Brooklyn, NY – Aussie Skin 550G
Date: August 19, 2025

To Whom it May Concern,

This letter is confirmation that AVM Technical Services has reviewed the August 14, 2024 Remedial Investigation Report for the 1709 Surf Ave project in Brooklyn, NY. Based on the data, the Aussie Skin 550G far exceeds and is approved for the level of VOC's listed in the report. The Aussie Skin 550G is a fully bonded system that acts as a waterproofing membrane as well as an excellent vapor barrier product.

For any further assistance or information, please reach out to the New York AVM Sales Director, Vince Caserta at (646) 946-9717 or a Technical Services Representative.

Best regards,

James Glade

James Glade
Technical Services Representative
AVM Industries, Inc.

ANGKOR GROUP
GENERAL CONTR

Socotec General Review Comments:
- Reviewed for Below Grade Waterproofing scope only
- All comments to be considered typical unless noted otherwise
- Dimensions, tolerances, quantities, and locations, not reviewed by Socotec
- Flash/seal all penetrations/fasteners through waterproofing membrane materials
- Follow below grade waterproofing manufacturer's recommendations for substrate preparation and waterproofing product application
- CM/GC to confirm and coordinate all work scope indicated / called out as "By Others"
- Structural engineer to confirm use of continuous liquid waterproofing over tops of pile caps, grade beams, etc as shown

Waterproofing Detail

1709 SURF AVE,
BROOKLYN, NY 11224

NOT PROVIDED - SOCOTEC 8/8/25 REVIEW OF RESPONSES

KEY

Inside Corner
0550G 0560G-6210

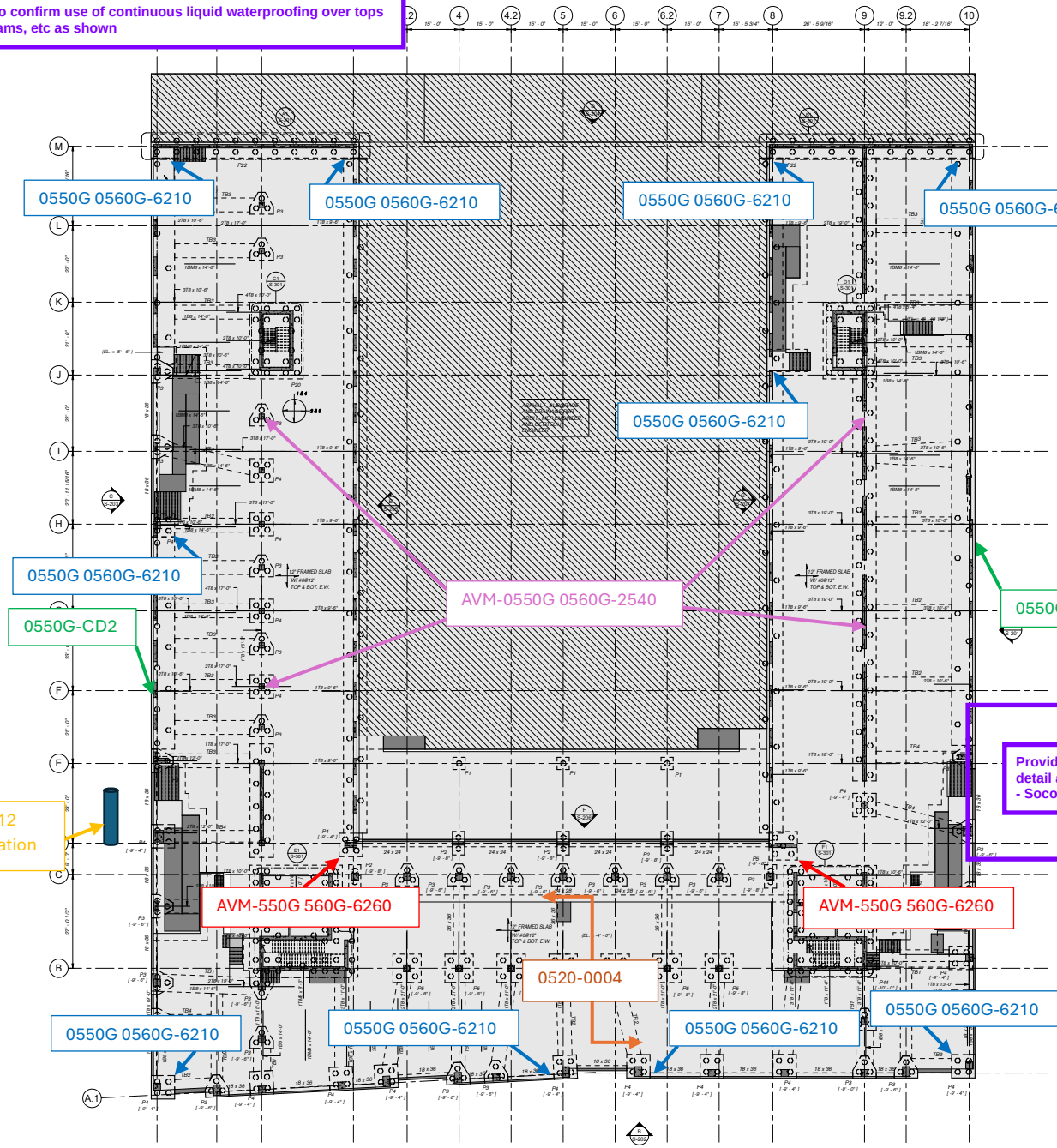
Over Grade-Beam
AVM-0550G 0560G-2540

Outside Corner
AVM-550G 560G-6260

Field
0520-0004

Over Footing Transition
0550G-CD2

Pipe Penetration
0550- 6512



FOUNDATION AND GROUND FLOOR FRAMING PLAN
3/32" = 1'-0"

Provide waterproofing section detail at elevator pit(s) - Socotec

NOT PROVIDED - SUBMIT PIT DETAIL - SOCOTEC 8/8/25 REVIEW OF RESPONSES

S9: SEE ENGINEERS COMMENTS THROUGHOUT

☒ APPROVED ☐ REVISE AND RESUBMIT
☐ APPROVED AS NOTED ☐ FOR RECORD ONLY

SUBMITTAL IS REVIEWED ONLY AS TO GENERAL CONFORMITY WITH DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. CORRECTIONS AND/OR COMMENTS MADE AS PART OF THIS SUBMITTAL REVIEW DO NOT RELIEVE CONTRACTOR OF RESPONSIBILITY FROM CONFORMANCE WITH THE CONTRACT DOCUMENTS, APPLICABLE CODES, AND LAWS – ALL OF WHICH HAVE PRIORITY OVER THIS SUBMITTAL. THE DESIGN PROFESSIONAL DOES NOT WARRANT OR REPRESENT THAT THE INFORMATION WITHIN THE SUBMITTAL IS EITHER ACCURATE OR COMPLETE. SOLE RESPONSIBILITY FOR CORRECT DESIGN, DETAILS AND DIMENSIONS SHALL REMAIN WITH THE PARTY PROVIDING THE SUBMITTAL. CONTRACTOR IS RESPONSIBLE FOR ALL DIMENSIONS, QUANTITIES AND PERFORMACE REQUIREMENTS TO BE CONFIRMED AND CORRELATED AT THE JOB SITE; FOR ALL INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESSES OR TO TECHNIQUES OF CONSTRUCTION; FOR ALL COORDINATION OF THE WORK OF ALL TRADES; FOR ASSURING CONSISTENCY WITH THE CONTRACT DOCUMENTS; AND FOR PERFORMING THE WORK ON A SAFE AND SATISFACTORY MANNER.

BRIGHT POWER INC.

REVIEWED BY: JohnDube DATE: 08/08/2025
EQUIPMENT TAG(S): 1709 Surf Ave BK - AVM_BP_SOC_S9 - responses to comments

Spec Section: 07	Project Name: CONEY ISLAND III
Project No.: 66469.00	Subm. No.: 071326-4
S9 Architecture & Engineering, DPC	
Corrections or comments made on the shop drawings during this review do not relieve contractor from compliance with requirements of the drawings and specifications. This check is only for review of general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating the work with that of all other trades; and performing the work in a safe and satisfactory manner.	☐ no exceptions taken ☐ make corrections noted ☑ revise and resubmit ☐ rejected ☐ no action taken
by: c.kroll	date: 7/16/2025

SHOP DRAWING / SUBMITTAL REVIEW — SOCOTEC

PROJECT: 1709 Surf Ave - Coney Island III SUBMISSION NO.: 071326-05-01

☒ REVIEWED FOR FOLLOWING SCOPE:

☐ FACADE	BY:	DATE:
☒ ROOFING & WATERPROOFING	BY: W. Callahan	DATE: 08/08/2025
☐ SUSTAINABILITY	BY:	DATE:

☐ NOT REVIEWED

SOCOTEC CONSULTING, INC.'S REVIEW AND COMMENTS ARE OF LIMITED RESPONSIBILITY, ARE BASED UPON THE INFORMATION PRESENTED IN THIS SUBMITTAL, AND DOES NOT RELIEVE OTHERS OF THEIR CONTRACTUAL RESPONSIBILITIES. SOCOTEC CONSULTING, INC.'S REVIEW AND COMMENTS ARE ONLY FOR THE DESIGN APPLICANT(S) AND/OR ARCHITECT/ENGINEER-OF-RECORD'S REVIEW, DETERMINATION, AND ACTION IN REGARD TO THE CONTRACT DOCUMENTS AND PROJECT DESIGN. SOCOTEC CONSULTING, INC.'S REVIEW AND COMMENTS ARE PROVIDED FOR INFORMATIONAL PURPOSES AND NOT AS A VERIFICATION, CERTIFICATION, ACTION, OR DIRECTION.

☒ APPROVED ☐ REVISE AND RESUBMIT
☐ APPROVED AS NOTED ☐ FOR RECORD ONLY

SUBMITTAL IS REVIEWED ONLY AS TO GENERAL CONFORMITY WITH DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. CORRECTIONS AND/OR COMMENTS MADE AS PART OF THIS SUBMITTAL REVIEW DO NOT RELIEVE CONTRACTOR OF RESPONSIBILITY FROM CONFORMANCE WITH THE CONTRACT DOCUMENTS, APPLICABLE CODES, AND LAWS – ALL OF WHICH HAVE PRIORITY OVER THIS SUBMITTAL. THE DESIGN PROFESSIONAL DOES NOT WARRANT OR REPRESENT THAT THE INFORMATION WITHIN THE SUBMITTAL IS EITHER ACCURATE OR COMPLETE. SOLE RESPONSIBILITY FOR CORRECT DESIGN, DETAILS AND DIMENSIONS SHALL REMAIN WITH THE PARTY PROVIDING THE SUBMITTAL. CONTRACTOR IS RESPONSIBLE FOR ALL DIMENSIONS, QUANTITIES AND PERFORMACE REQUIREMENTS TO BE CONFIRMED AND CORRELATED AT THE JOB SITE; FOR ALL INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESSES OR TO TECHNIQUES OF CONSTRUCTION; FOR ALL COORDINATION OF THE WORK OF ALL TRADES; FOR ASSURING CONSISTENCY WITH THE CONTRACT DOCUMENTS; AND FOR PERFORMING THE WORK ON A SAFE AND SATISFACTORY MANNER.

BRIGHT POWER INC.

REVIEWED BY: RyanTandy DATE: 08/13/2025
EQUIPMENT TAG(S): 1709 Surf Ave, Bk - AVM_BP

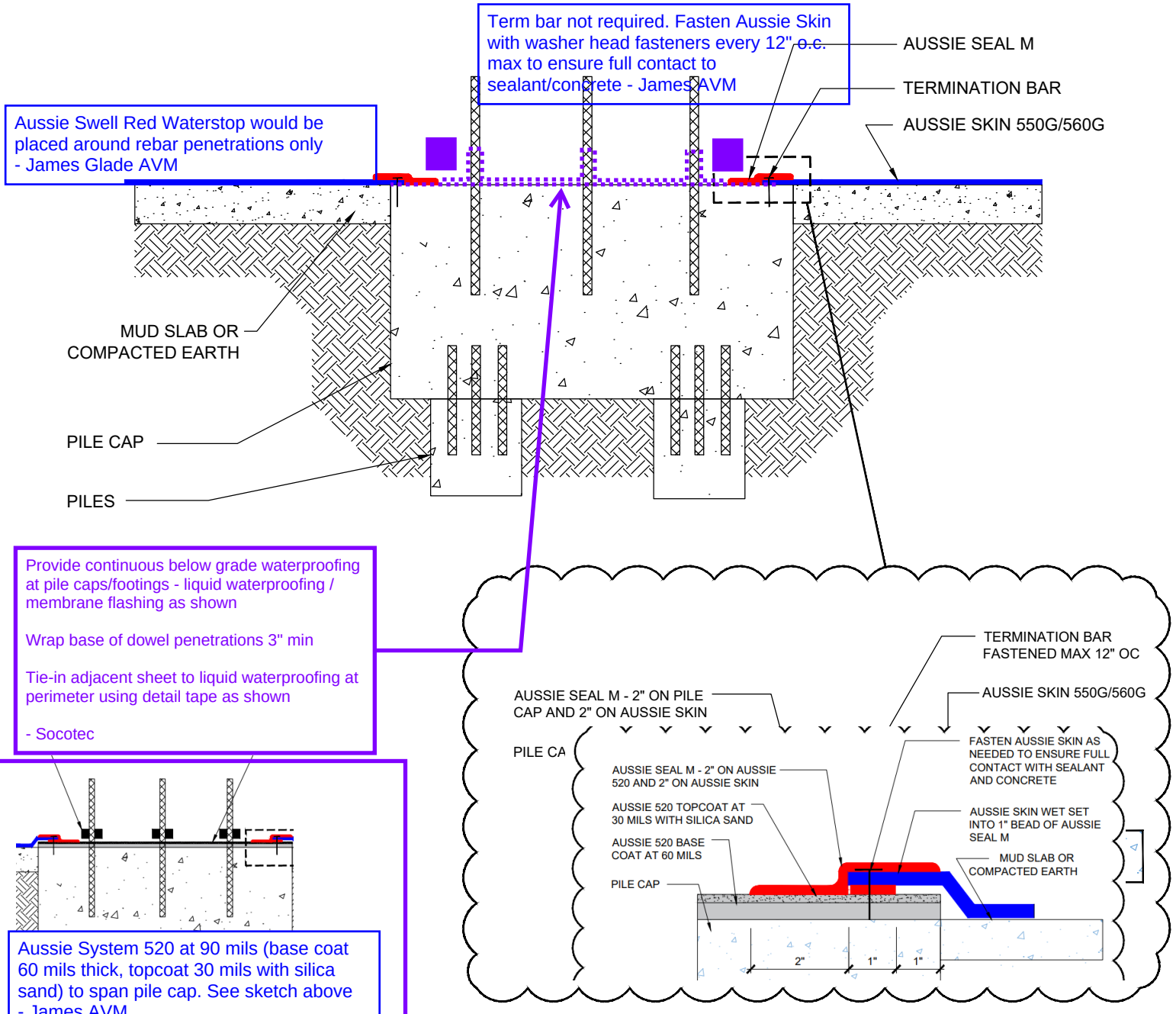
DETAIL #:
AVM-0550G_0560G-2630

AVM System 550G/560G
ANGKOR CORP

1709 Surf Ave

Pile Cap Detail - Non-Hydrostatic

AVM INDUSTRIES INC



Notes:

1. Aussie Skin 550G and 560G are Heavy Duty, Easy to Install, Puncture Resistant Sheet Waterproofing Membranes with added technologies creating excellent adhesion between the membrane and wet Concrete or Shotcrete. Aussie Skin 560G is an approved methane/VOC barrier.

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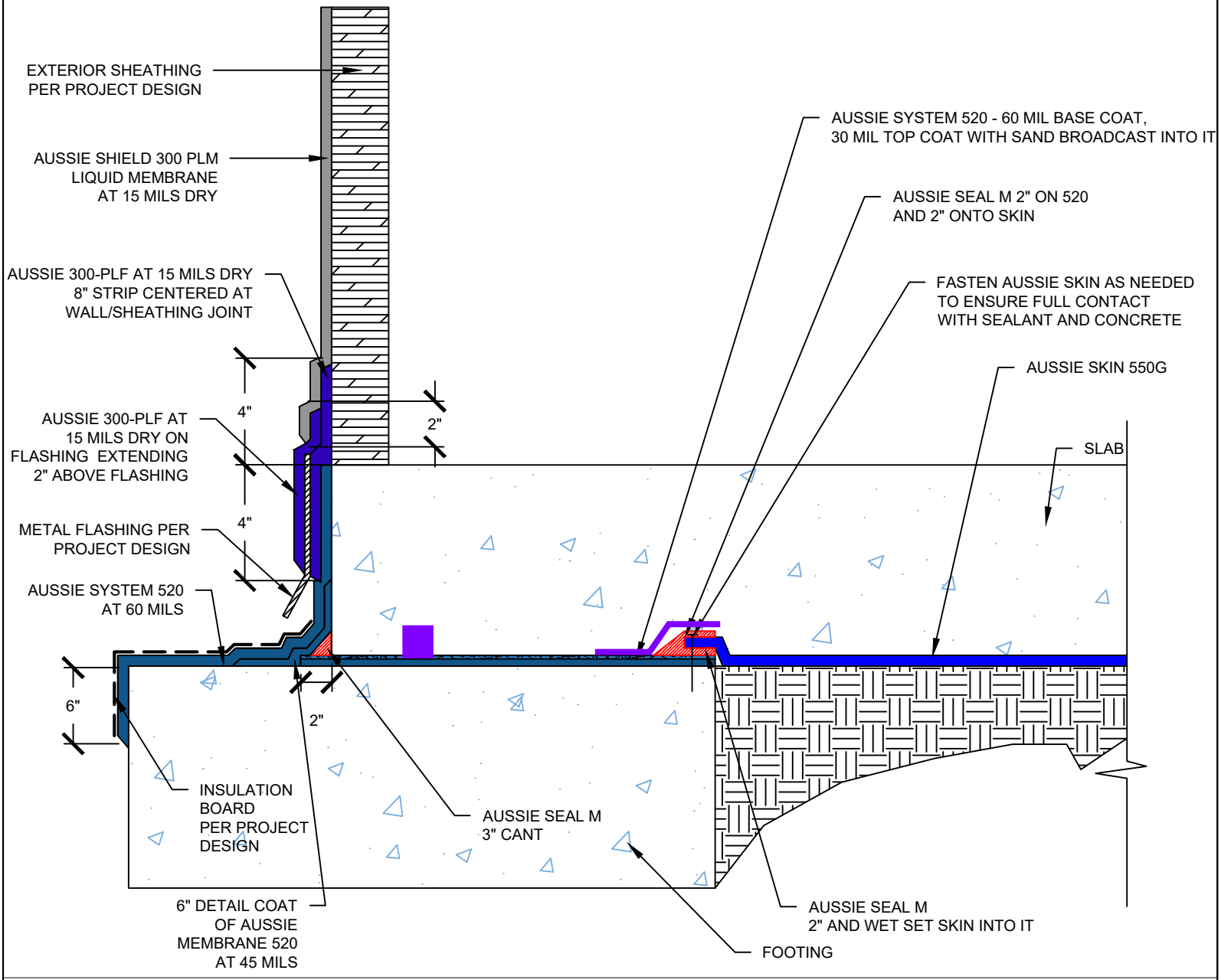
DETAIL #:
0550G-CD2

Project Name:
Surf Avenue

520 Over Footing Transition to Air Barrier

Aussie Skin 550G

AVM INDUSTRIES INC



Notes:

1. Aussie Skin 550G is a Heavy, Duty, Easy to Install, Puncture Resistant Sheet Waterproofing Membrane with added technologies creating excellent adhesion between the membrane and wet Concrete or Shot-Crete. Creating excellent adhesion between the membrane and wet Concrete or Shot-Crete.
2. All surfaces must be clean and sound before installing the lap joints. (Remove excess sand before applying double sided tape)
3. Epoxy Primer may be required if proper adhesion is not achieved.

AVM Industries, Inc.
8245 Remmet Ave, Canoga Park, CA 91304

Quality Waterproofing Products

888.414.1041 818.888.0050
www.avmindustries.com

FILE NAME: 0550G-CD1

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DETAIL #:
0550G_0560G-6210
Aussie Skin 550G_560G
ANGKOR CORP

1709 Surf Ave

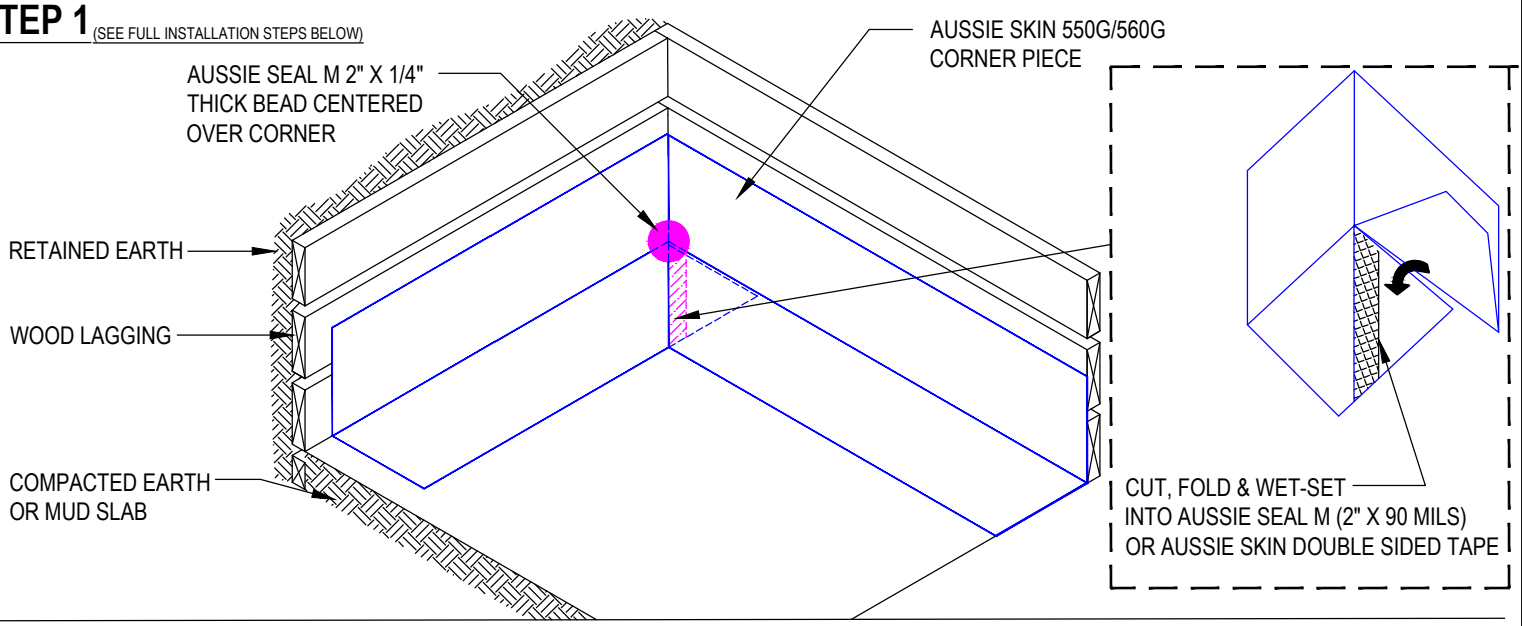
Inside Corner

Aussie Skin 550G/560G

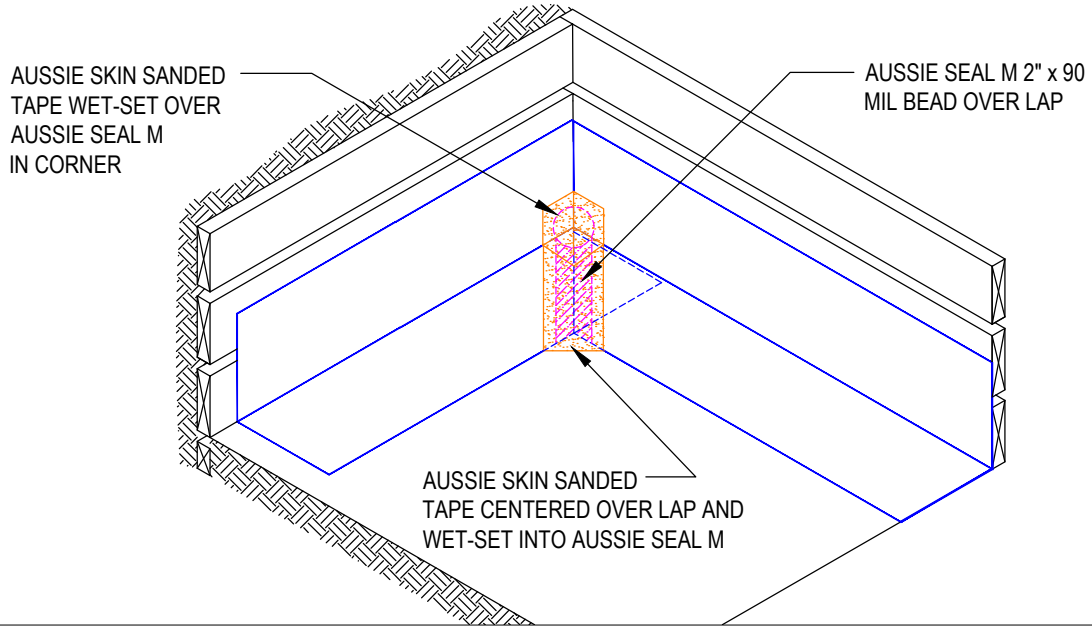
Submit all below grade waterproofing products and accessories as part of full system package for use on project including tapes, sealants/mastics, etc
- Socotec

AVM INDUSTRIES INC

STEP 1 (SEE FULL INSTALLATION STEPS BELOW)



STEP 2



Installation Steps:

1. Install Aussie Skin corner sheet and relief cut at corner as show
2. Place a 2" wide tooled bead of Aussie Seal M under 45° cut and wet-set Aussie Skin lap
3. Place a 2" x 1/4" thick tooled bead of Aussie Seal M centered at corner
4. Wet-set a piece of Aussie Skin Sanded Tape over 2" sealant in corner (relief cut sanded tape as needed to fit in corner)
5. Place a 2" x 90 mil tooled bead of Aussie Seal M over lap
6. Wet-set a piece of Aussie Skin Sanded Tape centered over the lap & Aussie Seal M and roll into place
7. Follow standard factory and/or non-factory lapping details for installation of Aussie Skin horizontal and vertical field sheets

AVM Industries, Inc.
8245 Remmet Ave, Canoga Park, CA 91304

Quality Waterproofing Products

888.414.1041 818.888.0050
www.avmindustries.com

FILE NAME: 0550G_0560G-6210

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DETAIL #:
0550G/0560G - 8004
System:
Aussie Skin 550G/560G

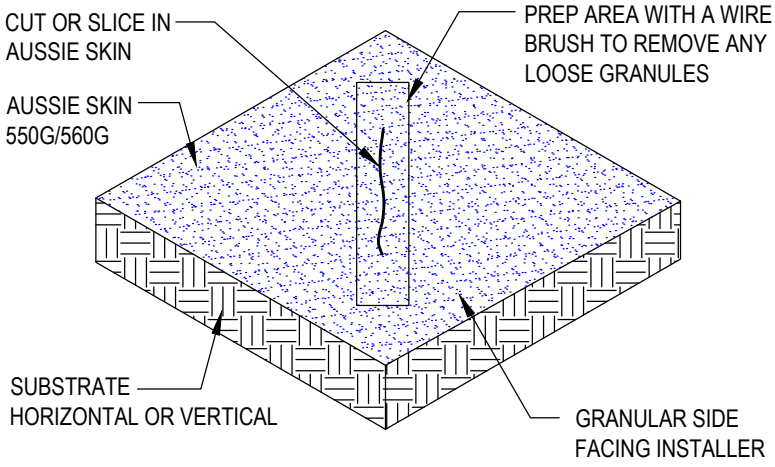
ANGKOR CORP
1709 Surf Ave

Repair Procedure for Cuts, Slices, and Small Punctures

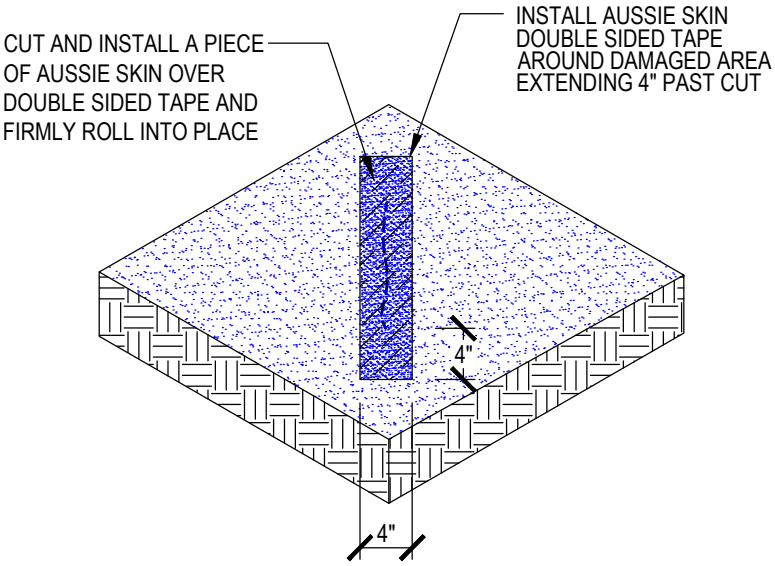
Aussie Skin 550G/560G

AVM INDUSTRIES INC

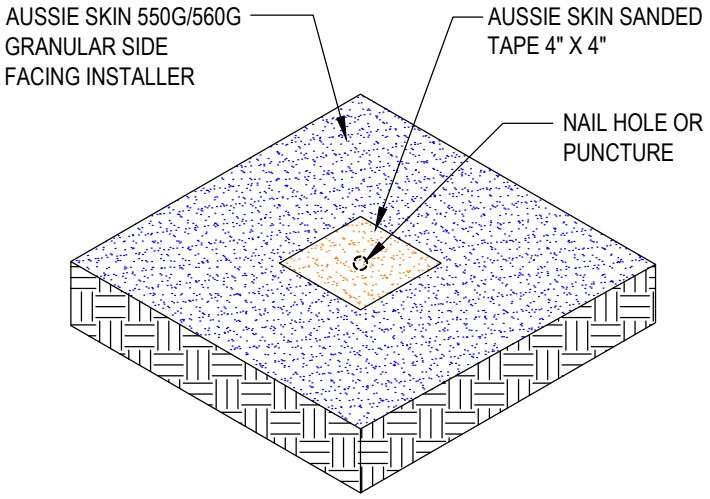
CUTS & SLICES - STEP 1



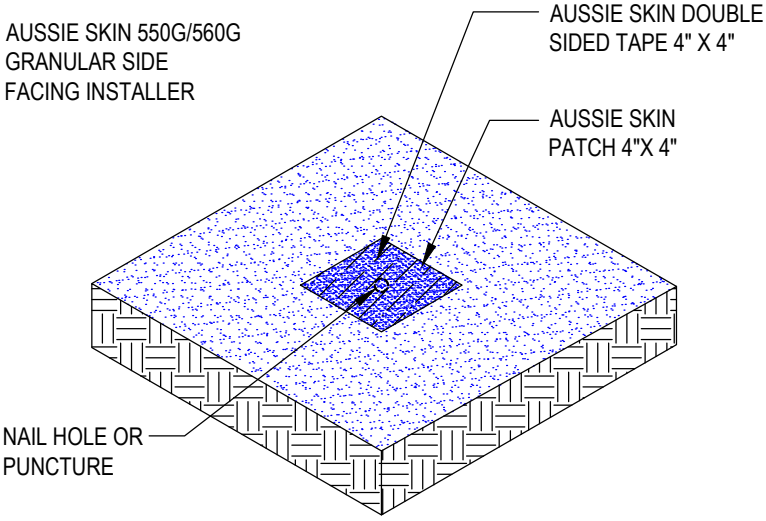
CUTS & SLICES - STEP 2



PUNCTURES - NON-WATER TABLE



PUNCTURES - WATER TABLE OR UNDER-SLAB



Notes:

1. Aussie Skin 550G and 560G are Heavy Duty, Easy to Install, Puncture Resistant Sheet Waterproofing Membranes with added technologies creating excellent adhesion between the membrane and wet Concrete or Shotcrete. Aussie Skin 560G is an approved methane/VOC barrier.

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DETAIL #:
AVM-550G_560G-6260

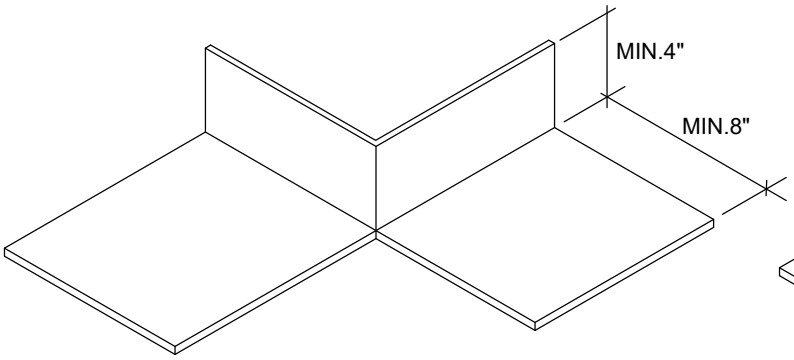
AVM System 550G_560G
ANGKOR CORP

1709 Surf Ave

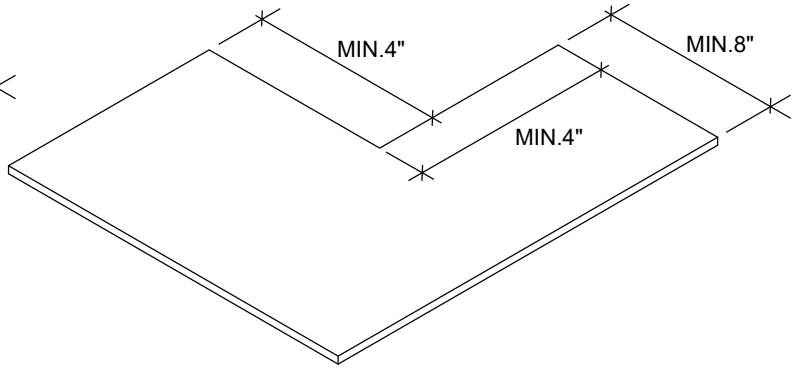
Outside Corner Detail - at Bottom of Wall

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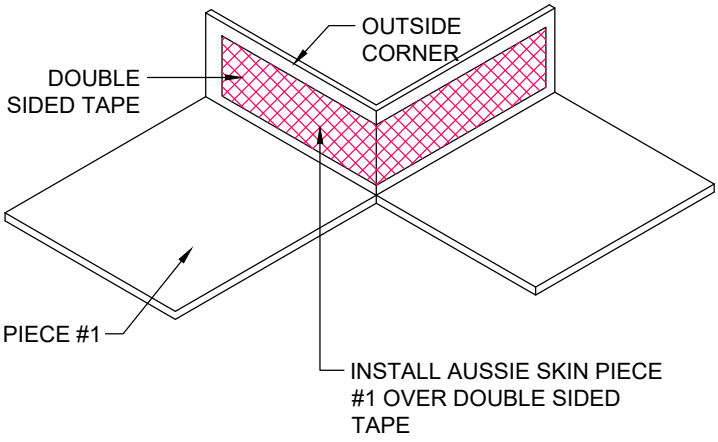
PIECE #1



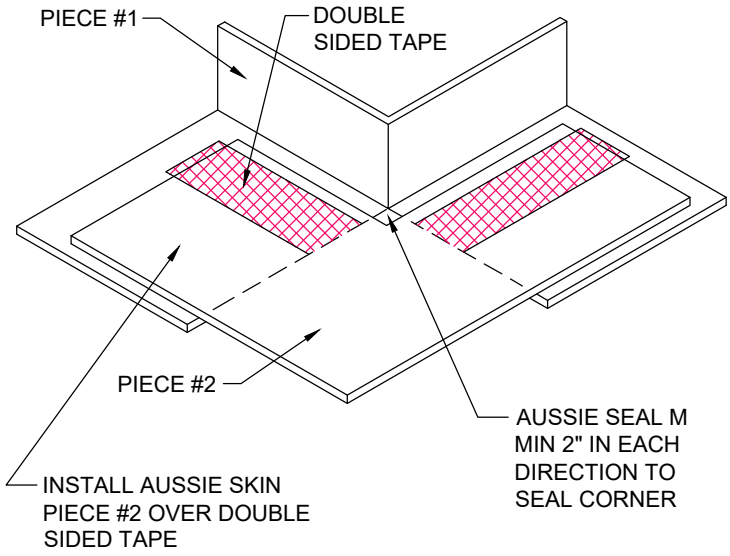
PIECE #2



STEP 1



STEP 2



Notes:

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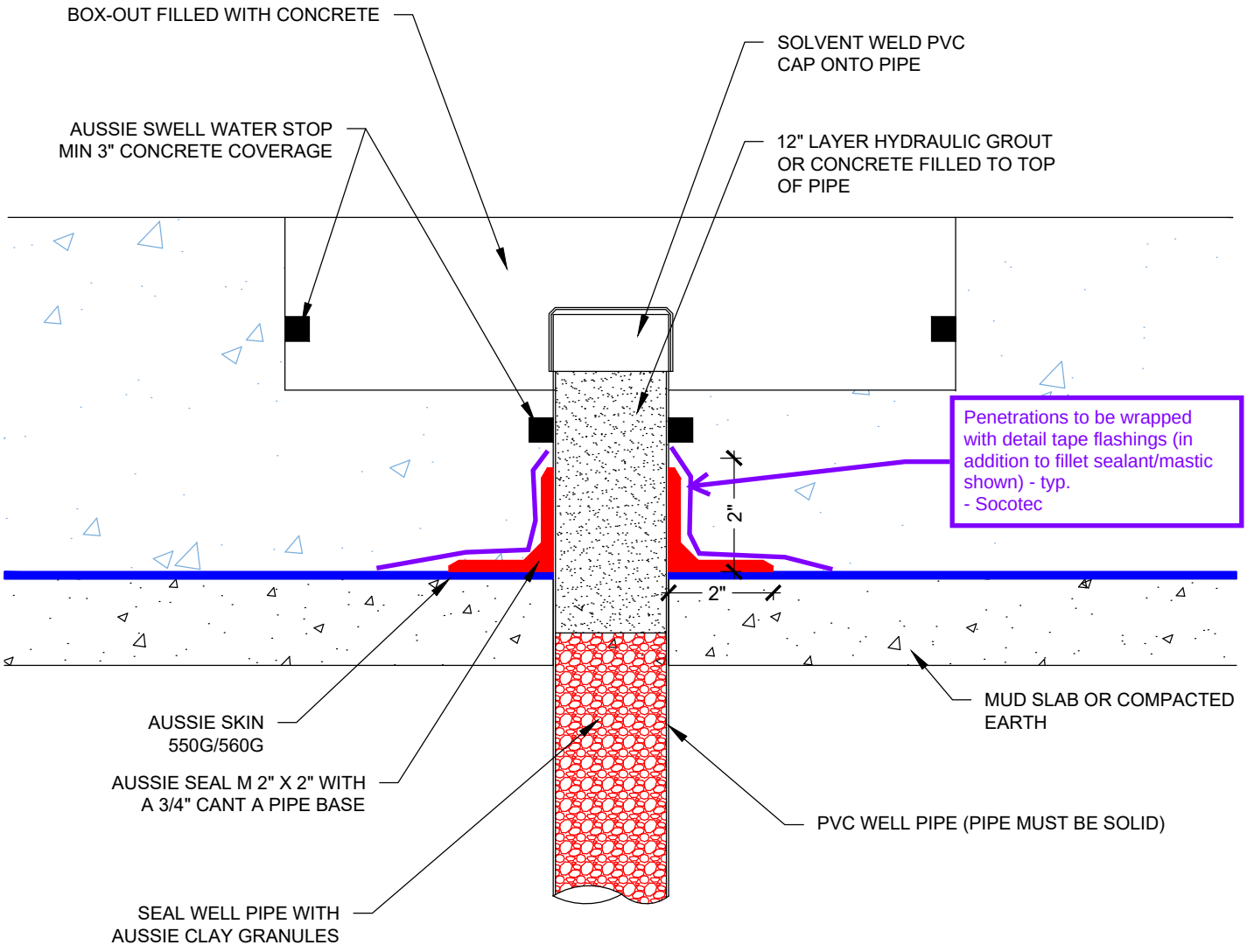
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DETAIL #:
AVM-0550G_0560G-2806

AVM System 550G/560G

Foundation Slab Well Pipe Sealing Box-out

AVM INDUSTRIES INC



NOTES:

1. Aussie Skin 550G and 560G are Heavy Duty, Easy to Install, Puncture Resistant Sheet Waterproofing Membranes with added technologies creating excellent adhesion between the membrane and wet Concrete or Shotcrete. Aussie Skin 560G is an approved methane/VOC barrier.

AVM Industries, Inc.
8245 Remmet Ave, Canoga Park, CA 91304

Quality Waterproofing Products

888.414.1041 818.888.0050
www.avmindustries.com

FILE NAME: 0550G_0560G-2806

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SUB-MEMBRANE DEPRESSURIZATION (SMD) SYSTEM INSPECTION CHECKLIST

Site Name: 1709 Surf Avenue, Brooklyn, New York Project Number: 170747001

Inspector Name:_____ Date: Weather:

Reason for Inspection (i.e., routine, severe condition, etc.):

		Y	N	NA	Remarks
	Records				
1	Is the Operations & Maintenance Plan readily available on-site?				
2	Based on site records, when was the last inspection, maintenance, or repair event?				
3	Based on site records, was the system inoperational for any amount of time since the last inspection, maintenance, or repair event? If yes, provide duration and details.				
	Alarm System				
4	Do the alarm lights indicate that the system is operational?				
	General System				
5	Is there any construction activity since the last event that included the breaching of the floor slab, on-site at the time of this inspection?				
6	If YES to Number 5, is there documentation that the HASP for the site was/is being followed?				
7	If YES to Number 5, is there documentation that all breaches in the floor slab have been sealed?				
8	Does all visible SMD system piping appear intact and undamaged?				
9	Have any intake points been constructed at the roof near (less than 10 feet) the SMD system in-line fan discharge points?				
	SMD System In-Line Fan Units				
10	Is the SMD system operational at the time of the inspection?				
11	What is the system flow prior to the fan (scfm)?				
12	What is the sytem vaccuum prior to the fan (in. WC)?				
13	Are the SMD system in-line fans expelling air at the discharge point?				

SMD System Components

- Rain guards on vent pipe exhausts
- Riser pipes labeled
- Sample ports on risers
- Vacuum gauges on the risers
- Alarm system present and properly labeled

Additional Remarks / Items to be addressed:

Sub-Membrane Depressurization System Startup Inspection

Differential Pressure Measurements

1709 Surf Avenue
Brooklyn, NY
BCP ID No. C224398
Langan Project No. 170747001

SMD Pressure Field Testing - Vacuum Monitoring Points			
Location	**Vacuum (inH2O)**	**Smoke Entering (Y/N)**	**Notes/Observations**
VMP-1			
VMP-2			
VMP-3			
VMP-4			
VMP-5			
VMP-6			
VMP-7			
VMP-8			
SMD Pressure Field Testing - Vent Risers			
Location	**Vacuum (inH20)**	**Smoke Entering (Y/N)**	**Notes/Observations**
Riser to SF-1			
Riser to SF-2			
Riser to SF-3			
Riser to SF-4			

Notes:
1. inH20 = inches of water column

SMD SYSTEM INSPECTION CHECKLIST

Site Name: 1709 Surf Avenue Location: Brooklyn, New York Project Number: 170747001

Inspector Name: _____ Date: _____ Weather Conditions: _____

Reason for Inspection (i.e., routine, maintenance, severe condition, etc.): _____

Check one of the following: **Y:** Yes **N:** No **NA**: Not Applicable

		Y	N	NA	Normal Situation	Remarks
	Records					
1	Is the Site Management Plan readily available on-site?				Y	
2	Based on site records, when was the last inspection, maintenance, or repair event?					
3	Based on site records, was the system inoperational for any amount of time since the last inspection, maintenance, or repair event? For how long? Provide details.				N	
	Alarm System					
4	Do the alarm lights indicate that the system is operational?				Y	
	General System					
5	Is there any construction activity, or indication of any construction activity within the past certification year (including any tenant improvements), that included the breaching of the floor slab, on-site at the time of this inspection?				N	
6	If YES to number 5, is there documentation that the Soil Management Plan, HASP, and CAMP for the site was/is being followed?				NA if N to 5/ Y if Y to 5	
7	If YES to number 5, is there documentation that all breaches in the floor slab have been sealed?				NA if N to 5/ Y if Y to 5	
8	Does all visible SMD system piping appear intact and undamaged?				Y	
9	Have any intake points been constructed at the roof near (less than 10 feet) the SMD system blower discharge point?				N	

SMD SYSTEM INSPECTION CHECKLIST

Site Name: 1709 Surf Avenue Location: Brooklyn, New York Project Number: 170747001

Inspector Name: _____ Date: _____ Weather Conditions: _____

Reason for Inspection (i.e., routine, maintenance, severe condition, etc.): _____

Check one of the following: **Y:** Yes **N:** No **NA**: Not Applicable

		Y	N	NA	Normal Situation	Remarks
	SMD System Blower Unit					
10	Is the SMD system blower operational at the time of the inspection?				Y	
11	What is the VelociCalc Meter reading?					
12	Is the SMD system blower expelling air at the discharge point?				Y	
13	Have dust and debris been removed from surface of blower?				Y	
14	Have dirty or clogged filter cartridges been replaced?				Y	
15	Vacuum Monitoring Point Readings	**Reading**			**Sufficient?**	**Remarks**

*** If the answer to any of the above questions indicate the SMD system is non-operational or malfunctioning, or that this EC is in non-compliance,additional remarks must be provided and, where applicable, documentation attached to this checklist detailing additional inspection and repair activities.**

Additional remarks _____
_____
_____
_____
_____
_____
_____
_____

Minimum Inspection Schedule: SMD inspections will be conducted quarterly for the first certification year at a minimum. Additional inspections will also be conducted at times of maintenance, repair, or severe condition events. The minimum schedule will be revised, as necessary, following the first certification year. All inspection events will utilize this checklist.

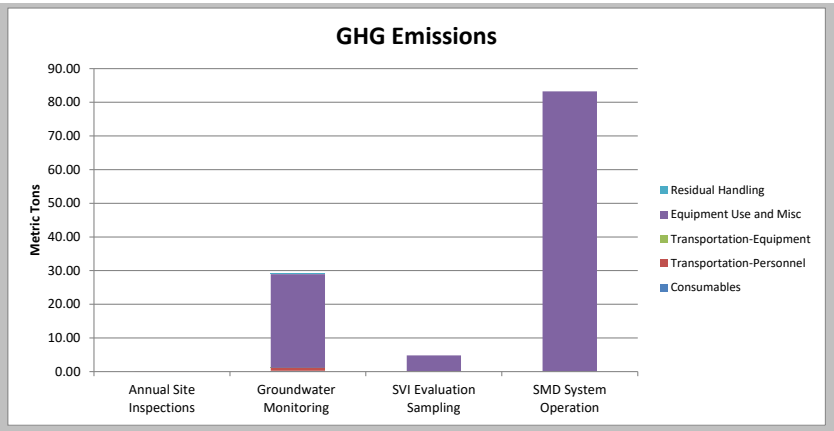
APPENDIX M

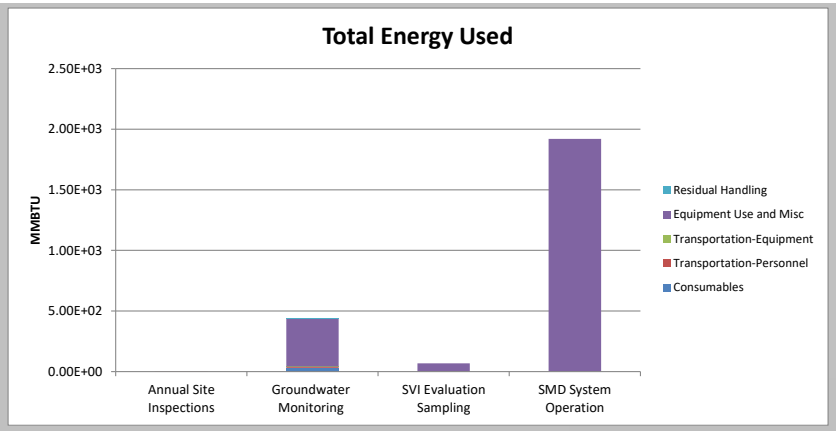
ENVIRONMENTAL FOOTPRINT SUMMARY

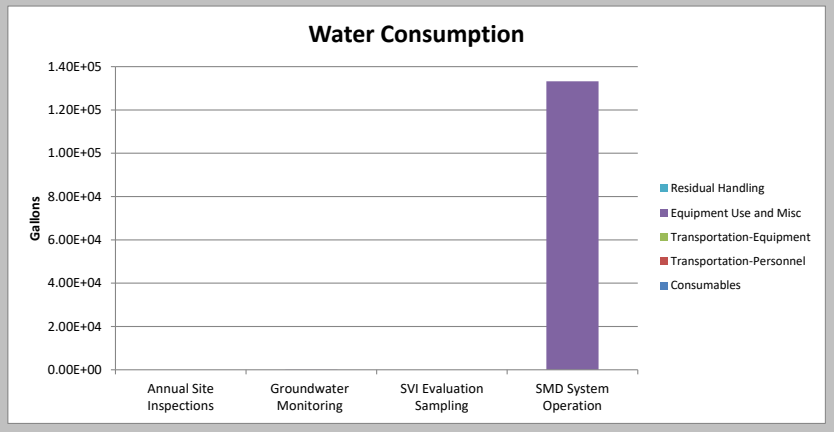
Sustainable Remediation - Environmental Footprint Summary

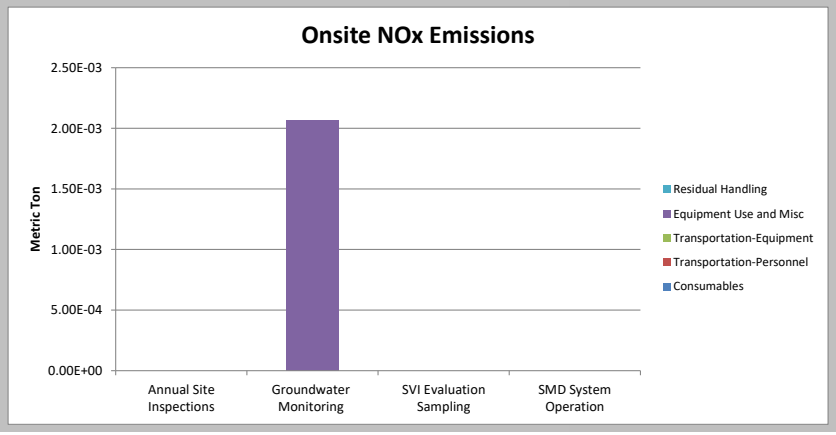
Phase	Activities	GHG Emissions	Total Energy Used	Water Consumption	Electricity Usage	Onsite NOx Emissions	Onsite SOx Emissions	Onsite PM10 Emissions	Total NOx Emissions	Total SOx Emissions	Total PM10 Emissions	Accident Risk Fatality	Accident Risk Injury
		metric ton	MMBTU	gallons	MWH	metric ton	metric ton	metric ton	metric ton	metric ton	metric ton		
Annual Site Inspections	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	0.00	4.9E-02	NA	NA	NA	NA	NA	3.8E-07	5.4E-06	5.8E-08	1.3E-08	1.7E-06
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.1E-07	9.2E-05
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	4.85E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.84E-07	5.44E-06	5.76E-08	2.27E-07	9.37E-05
Groundwater Monitoring	Consumables	0.26	3.2E+01	NA	NA	NA	NA	NA	4.8E-04	7.4E-04	1.0E-04	NA	NA
	Transportation-Personnel	0.86	1.1E+01	NA	NA	NA	NA	NA	3.2E-04	7.6E-05	5.4E-05	1.4E-05	1.1E-03
	Transportation-Equipment	0.00	1.9E-02	NA	NA	NA	NA	NA	4.6E-07	8.2E-09	4.1E-08	4.7E-07	3.8E-05
	Equipment Use and Misc	27.83	4.0E+02	2.0E+01	0.0E+00	2.1E-03	2.1E-04	1.9E-04	1.3E-01	1.0E-01	1.1E-02	3.0E-06	1.5E-03
	Residual Handling	0.23	3.2E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	7.7E-05	4.4E-06	1.3E-05	1.2E-06	1.0E-04
	Sub-Total	29.18	4.43E+02	2.00E+01	0.00E+00	2.06E-03	2.11E-04	1.86E-04	1.36E-01	1.01E-01	1.14E-02	1.86E-05	2.78E-03
SVI Evaluation Sampling	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	0.11	1.4E+00	NA	NA	NA	NA	NA	4.2E-05	1.2E-05	6.9E-06	1.7E-06	1.4E-04
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	4.70	6.7E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.3E-02	1.7E-02	1.9E-03	1.2E-07	1.4E-04
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	4.82	6.87E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.26E-02	1.69E-02	1.89E-03	1.86E-06	2.84E-04
SMD System Operation	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	83.27	1.9E+03	1.3E+05	2.6E+02	0.0E+00	0.0E+00	0.0E+00	8.0E-02	1.1E-01	6.0E-02	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	83.27	1.92E+03	1.33E+05	2.61E+02	0.00E+00	0.00E+00	0.00E+00	8.03E-02	1.08E-01	6.01E-02	0.00E+00	0.00E+00
Total		**1.2E+02**	**2.4E+03**	**1.3E+05**	**2.6E+02**	**2.1E-03**	**2.1E-04**	**1.9E-04**	**2.4E-01**	**2.3E-01**	**7.3E-02**	**2.1E-05**	**3.2E-03**

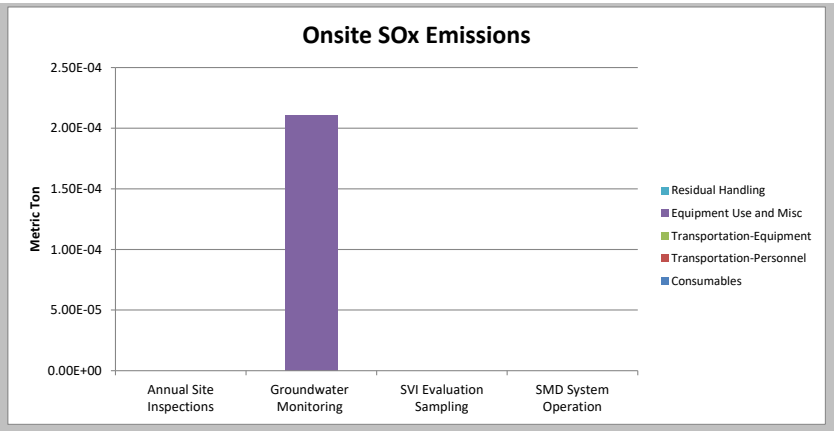
Remedial Alternative Phase	Non-Hazardous Waste Landfill Space	Hazardous Waste Landfill Space	Topsoil Consumption	Costing	Lost Hours - Injury	Percent electricity from renewable sources	Total Cost with Footprint Reduction
	tons	tons	cubic yards	$		%	
Annual Site Inspections	0.0E+00	0.0E+00	0.0E+00	0	7.5E-04	0.0%	$0
Groundwater Monitoring	4.0E-02	0.0E+00	0.0E+00	0	2.2E-02	0.0%	
SVI Evaluation Sampling	0.0E+00	0.0E+00	0.0E+00	0	2.3E-03	0.0%	
SMD System Operation	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00	24.2%	
Total	**4.0E-02**	**0.0E+00**	**0.0E+00**	**$0**	**2.5E-02**	**6.1%**	

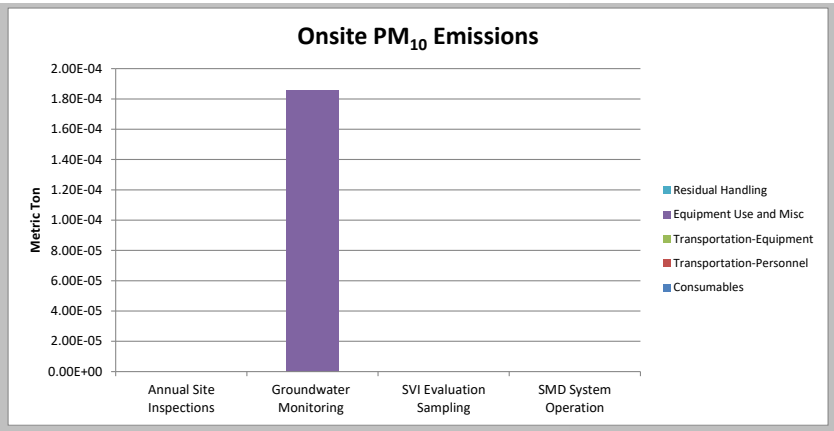

GHG Emissions
Metric Tons
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Annual Site Inspections
Groundwater Monitoring
SVI Evaluation Sampling
SMD System Operation
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

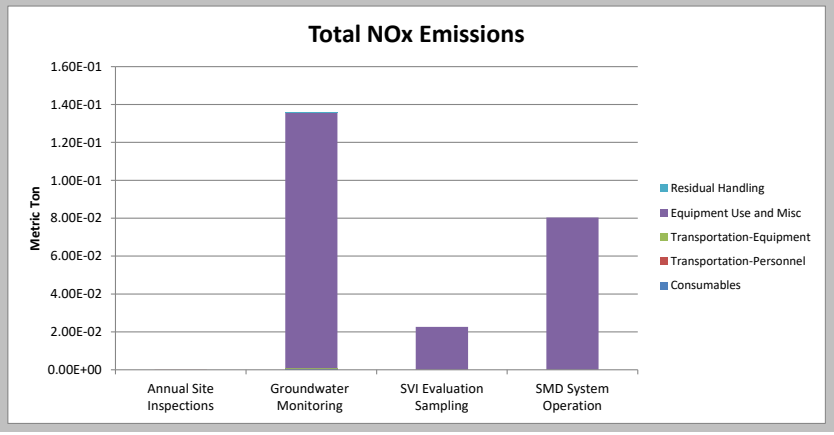

Total Energy Used
MMBTU
2.50E+03
2.00E+03
1.50E+03
1.00E+03
5.00E+02
0.00E+00
Annual Site Inspections
Groundwater Monitoring
SVI Evaluation Sampling
SMD System Operation
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

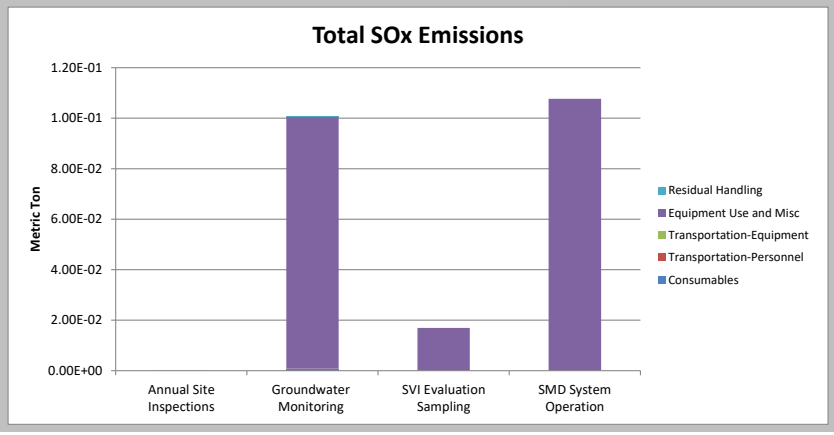

Water Consumption
Gallons
1.40E+05
1.20E+05
1.00E+05
8.00E+04
6.00E+04
4.00E+04
2.00E+04
0.00E+00
Annual Site Inspections
Groundwater Monitoring
SVI Evaluation Sampling
SMD System Operation
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

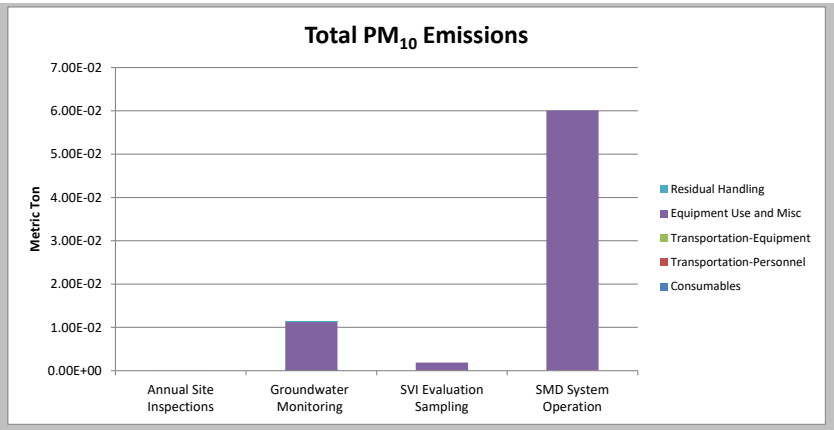

Onsite NOx Emissions
Metric Ton
2.50E-03
2.00E-03
1.50E-03
1.00E-03
5.00E-04
0.00E+00
Annual Site Inspections
Groundwater Monitoring
SVI Evaluation Sampling
SMD System Operation
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

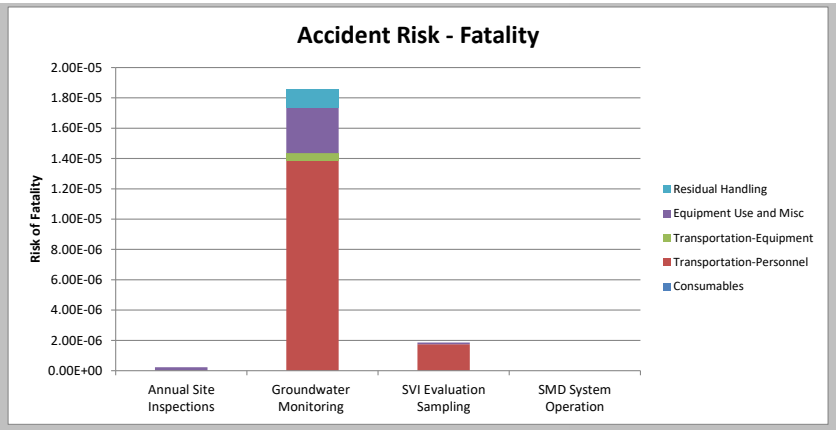

Onsite SOx Emissions
Metric Ton
2.50E-04
2.00E-04
1.50E-04
1.00E-04
5.00E-05
0.00E+00
Annual Site Inspections
Groundwater Monitoring
SVI Evaluation Sampling
SMD System Operation
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

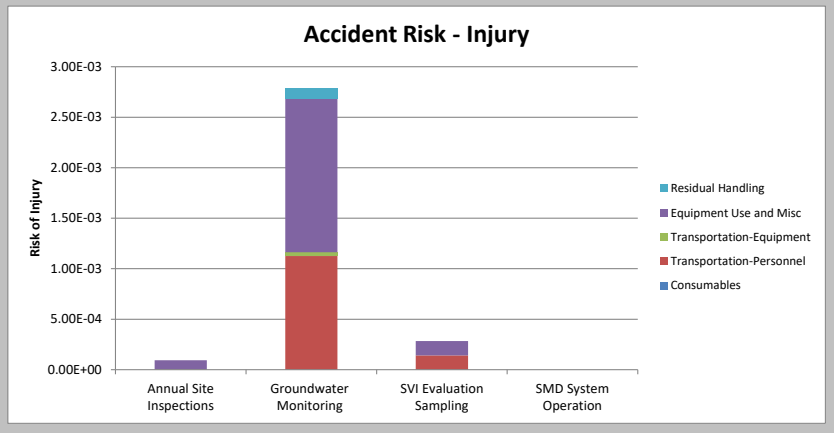

Onsite PM10 Emissions
Metric Ton
2.00E-04
1.80E-04
1.60E-04
1.40E-04
1.20E-04
1.00E-04
8.00E-05
6.00E-05
4.00E-05
2.00E-05
0.00E+00
Annual Site Inspections
Groundwater Monitoring
SVI Evaluation Sampling
SMD System Operation
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

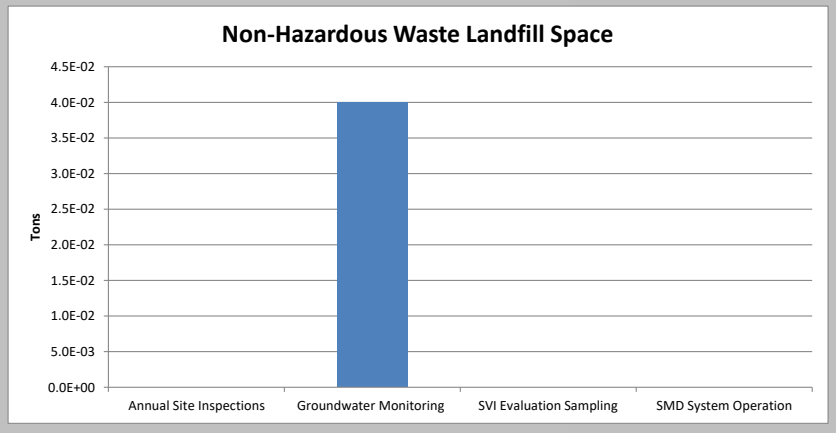

Total NOx Emissions
Metric Ton
1.60E-01
1.40E-01
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
Annual Site Inspections
Groundwater Monitoring
SVI Evaluation Sampling
SMD System Operation
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

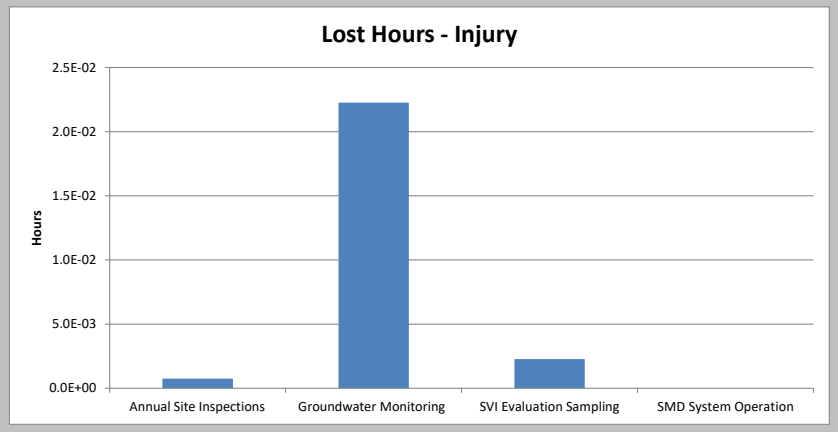

Total SOx Emissions
Metric Ton
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
Annual Site Inspections
Groundwater Monitoring
SVI Evaluation Sampling
SMD System Operation
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Total PM10 Emissions
Metric Ton
7.00E-02
6.00E-02
5.00E-02
4.00E-02
3.00E-02
2.00E-02
1.00E-02
0.00E+00
Annual Site Inspections
Groundwater Monitoring
SVI Evaluation Sampling
SMD System Operation
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Accident Risk - Fatality
Risk of Fatality
2.00E-05
1.80E-05
1.60E-05
1.40E-05
1.20E-05
1.00E-05
8.00E-06
6.00E-06
4.00E-06
2.00E-06
0.00E+00
Annual Site Inspections
Groundwater Monitoring
SVI Evaluation Sampling
SMD System Operation
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Accident Risk - Injury
Risk of Injury
3.00E-03
2.50E-03
2.00E-03
1.50E-03
1.00E-03
5.00E-04
0.00E+00
Annual Site Inspections
Groundwater Monitoring
SVI Evaluation Sampling
SMD System Operation
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Non-Hazardous Waste Landfill Space
Tons
4.5E-02
4.0E-02
3.5E-02
3.0E-02
2.5E-02
2.0E-02
1.5E-02
1.0E-02
5.0E-03
0.0E+00
Annual Site Inspections
Groundwater Monitoring
SVI Evaluation Sampling
SMD System Operation


Lost Hours - Injury
2.5E-02
2.0E-02
1.5E-02
1.0E-02
5.0E-03
0.0E+00
Hours
Annual Site Inspections
Groundwater Monitoring
SVI Evaluation Sampling
SMD System Operation

APPENDIX N

GREEN REMEDIATION SCREENING CHECKLIST

Climate Screening Checklist

Background Information

- **Project Manager**: Lamees Esmail, PE
- **Site Name:** 1709 Surf Avenue
- **Site Number**: C224398
- **Site Location**: 1709 Surf Avenue, Brooklyn, NY
- **Site Elevation (average above sea level)**: Surface elevations (el) range from about el 5.46 feet[1] on the northeast corner of the site to el 9.71 feet on the south-central part of the site. The topography of the site gently slopes north; however, the regional topographic gradient of the surrounding areas gently slopes south towards Coney Island Beach.
- **ClimAID Region**: Region 4 – New York City and Long Island



- **Remedial Stage/Site Classification**: Remedial Design Stage, Class A
- **Contamination - Media Impacted/ Contaminants of Concern:**

  Contaminants of concern are based on the source, concentration, frequency, and locations of contaminants identified in soil, groundwater, and soil vapor across the site. The contaminants of concern are volatile organic compounds (VOCs) and chlorinated volatile organic compounds (CVOCs) in soil, groundwater, and/or soil vapor and semivolatile organic compounds (SVOCs), pesticides, and metals in soil and/or groundwater.
- **Proposed/Current Remedy:**

  A Track 1 remedy is proposed which includes excavation and removal of soil/fill with exceedances

[1] Elevations in this RAWP refer to North American Vertical Datum of 1988 (NAVD88), which is about 1.1 feet above mean sea level at Sandy Hook, New Jersey.

above the Unrestricted Use (UU) Soil Cleanup Objectives (SCOs) and completion of in-situ oxidation groundwater treatment to eliminate exceedances above the NYSDEC Standards and Guidance Values (SGVs).

- **What is the predicted timeframe of the remedy? Will components of the remedy still be in place in 10+ years?**

  No, the components of the remedy will not be in place in 10+ years. The recommended Track 1 remedy is anticipated to take about seven months to complete. Following the completion of the Remedial Action Work Plan (RAWP), no engineering controls (ECs)/ Institutional Controls (ICs) will be placed on site.

- **Is the site in proximity to any sensitive receptors? (e.g. wetlands, waterbodies, residential properties, hospitals, schools, drinking water supplies, etc.)**

  Land use within a half-mile radius is urban and includes residential, commercial, institutional, utility/transportation, light industrial buildings and public parks and beaches. The nearest ecological receptors are the Coney Island Creek, located about 1,400 feet northwest of the site, and the Lower New York Bay, located about 1,400 feet south of the site. Sensitive receptors, as defined in DER-10, located within a half mile of the site are listed below:

Block and Lot Number	Name (Approximate distance from site)	Address
Block 7073 Lot 101	MCU/Steeplechase Park/Maimonides Park (about 0.07 miles south of the site)	1904 Surf Avenue Brooklyn, NY 11224
Block 7019 Lot 43	Brooklyn Public Library, Coney Island Branch (about 0.08 miles northwest of the site)	1901 Mermaid Avenue Brooklyn, NY 11224
Block 7020 Lot 39	Liberation Diploma Plus – K728 (about 0.11 miles north of the site)	2865 West 19th Street Brooklyn, NY 11224
Block 7058 Lot 9	Santos White CommunityGarden (about 0.16 miles northwest of the site)	2110 Mermaid Avenue Brooklyn, NY 11224
Block 7297 Lot 10	Abe Stark Skating Rink (about 0.19 miles southwest of the site)	1902 West 19th Street Brooklyn, NY 11214
Block 7017 Lot 35	La Puerta Abierta Pre-K and Day Care Center (about 0.19 miles northwest of the site)	2864 West 21st Street Brooklyn, NY 11224
Block 7022 Lot 31	Charles F. Murphy Early Childhood Development Center (about 0.19 miles northeast of the site)	2856 West 15th Street Brooklyn, NY 11224
Block 7023 Lot 45	Coney Island Daycare (about 0.19 miles northeast of the site)	1415 Mermaid Avenue Brooklyn, NY 11224

Block 8700 Lot 25	Coney Island Beach and Boardwalk (about 0.21 miles south of the site)	Coney Island Beach Brooklyn, NY 11224
Block 7071 Lot 130	Coney Island Amphitheater (about 0.22 miles southwest of the site)	3052 West 21st Street Brooklyn, NY 11224
Block 7056 Lot 14	Carey Gardens Day Care Center/Police Athletic League, Inc. (about 0.26 miles southwest of the site)	2964 West 23rd Street Brooklyn, NY 11224
Block 7074 Lot 76	Coney Island Boardwalk Garden (about 0.26 miles southeast of the site)	Stillwell Ave Brooklyn, NY 11214
Block 7071 Lot 76	Seaside Park (about 0.28 miles southwest of the site)	3054 West 22nd Street Brooklyn, NY 11224
Block 7266 Lot 40	Neptune Playground (about 0.29 miles northeast of the site)	West 12th Street between Neptune Avenue and Surf Avenue Brooklyn, NY 11224
Block 8694 Lot 18	Coney Island Museum (about 0.29 miles southeast of the site)	1208 Surf Avenue Brooklyn, NY 11224
Block 7056 Lot 14	New York City Housing Authority Carey Gardens Community Center (about 0.29 miles southwest of the site)	2315 Surf Avenue Brooklyn, NY 11224
Block 7266 Lot 40	P.S. 90 – The Magnet School for Environmental Studies and Community Wellness/Edna Cohen Elementary (about 0.32 miles northeast of the site)	2840 West 12th Street Brooklyn, NY 11224
Block 7266 Lot 40	YWCA-NYC After School @ P.S. 90 (about 0.32 miles northeast of the site)	2840 West 12th Street Brooklyn, NY 11224
Block 7268 Lot 3	Luna Playground (about 0.33 miles east of the site)	1206 West 12st Street Brooklyn, NY 11224
Block 6965 Lot 100	Kaiser Park (about 0.34 miles northwest of the site)	2529 Neptune Avenue Brooklyn, NY 11224
Block 6965 Lot 125	West 23rd Street Community Garden (about 0.38 miles northwest of the site)	2403 Neptune Avenue Brooklyn, NY 11224
Block 7268 Lot 1	Dvora Day Care Center @ Building Blocks Daycare Center/ Dvora, Inc. Day Care Center (about 0.39 miles northeast of the site)	2817 West 12th Street Brooklyn, NY 11224
Block 7054 Lot 45	Surf Playground (about 0.39 miles southwest of the site)	2727 Surf Avenue Brooklyn, NY 11224

Block 7053 Lot 14	The Cyclone at Coney Island (about 0.40 miles southeast of the site)	801 Riegelmann Boardwalk Brooklyn, NY 11224
Block 7054 Lot 45	P.S. 288 The Shirley Tanyhill (about 0.40 miles west of the site)	2950 West 25th Street Brooklyn, NY, 11224
Block 7054 Lot 45	Heartshare Human Services @ P.S. 288 (about 0.40 miles west of the site)	2950 West 25th Street Brooklyn, NY, 11224
Block N/A Lot N/A	Nettie Tenenbaum Auletta Sitting Area (about 0.40 miles southwest of the site)	West 25th Street & Riegelmann Boardwalk Brooklyn, NY 11224
Block 7268 Lot 213	Fun Island Playground (about 0.42 miles east of the site)	825 Surf Avenue Brooklyn, NY 11224
Block 7053 Lot 14	Heartshare St. Vincent's Services-Surfside Gardens Cornerstone (about 0.43 miles west of the site)	2947 West 28th Street, 1st Floor Brooklyn, NY 11224
Block 7052 Lot 34	Headstart Family Center (about 0.43 miles west of the site)	2960 West 27th Street Brooklyn, NY 11224
Block 7069 Lot 14	Poseidon Playground (about 0.44 miles southwest of the site)	3081-3099 West 27th Street Brooklyn, NY 11224
Block 6965 Lot 140	Mark Twain I.S. 239 for the Gifted & Talented – K239 (about 0.45 miles northwest of the site)	2401 Neptune Avenue Brooklyn, NY 11224
Block 6965 Lot 140	NIA Community Services Network @ I.S. 239 (about 0.45 miles northwest of the site)	2401 Neptune Avenue Brooklyn, NY 11224
Block 8698 Lot 1	New York Aquarium (about 0.49 miles southeast of the site)	602 Surf Avenue Brooklyn, NY 11224
Block 7011 Lot 11	Nike Group Family WeeCare (about 0.50 miles northwest of the site)	2828 West 28th Street Brooklyn, NY 11224

- **Is the site in a disadvantaged community (DAC) or potential environmental justice area (PEJA) (Use DECinfolocator: DECinfo Locator (ny.gov))?**

  ■ Yes ☐ No

  The site is located in a disadvantaged community and a potential environmental justice area as shown below (map taken from the DECInfo Locator)



If the site is in a DAC or PEJA, will climate impacts be magnified? If yes, list how and why.

☐ **Yes** ■ **No**

- **Should thresholds of concern be lowered to account for magnification of impacts? If yes, indicate how lower thresholds will be used in the screening.**

☐ **Yes** ■ **No**

Climate Screening Table*

Potential Climate Hazards	**Relevant to the Site Location** (Y/N/NA)[1]	**Projected Change** (Reference data source/Model)[3]	**Potential to Impact Remedy** (Y/N)	**Is remedy/site already resilient?** (Y/N)[4]
Precipitation	Potentially – Based on the Resilience Analysis and Planning Tool (RAPT)	N/A – Based on RAPT	N	Y – Stormwater managed by existing infrastructure. During construction a site-specific Stormwater Pollution Prevention Plan (SWPPP) was followed.
Temperature[2] (Extreme Heat or Cold Weather Impacts)	Potentially – Based on RAPT	N/A – Based on RAPT	N	Y
Sea Level Rise	Potentially – Based on Sea Level Rise Viewer	N – Based on Sea Level Rise Viewer	N	Y - Sea level is not expected to rise to levels to be of concern to site
Flooding	Potentially – Based on FEMA National Flood Hazard Layer	N - Based on FEMA National Flood Hazard Layer	N	Y – Stormwater managed by existing infrastructure. During construction best management practices were followed.
Storm Surge	Y – Based on National Hurricane Service Center	N/A	N	
Wildfire	N – Based on RAPT	N/A	N/A	N/A
Drought	N – Based on US Drought Portal	N/A	N/A	N/A
Storm Severity	Y – Based on RAPT	Y	N	Y – Stormwater managed by existing infrastructure
Landslides	N – Based on RAPT	N/A	N/A	N/A
Other Hazards:	N – Based on RAPT	N/A	N/A	N/A

* Links to potential data sources can be found on the following page

[1] If the first column is N --> The rest of the columns will be N/A, the hazard is not applicable to the site.

[2] Extreme Heat: periods of three or more days above 90°F- Extreme Cold: Individual days with minimum temperatures at or below 0 degrees F (NYSERDA ClimAID report)

[3] List the projected change in specific terms or units e.g. inches of rain fall, feet of sea level rise, etc.

[4] If final column is Y, provide reasoning, if the final column is N --> Climate Vulnerability Assessment (CVA) required.

Required Next Steps (If no further action is required, provide justification):

No further actions are required.

Potential Data Sources (not an exhaustive list)- from Superfund Climate Resilience: Vulnerability Assessment | US EPA

NYSERDA ClimAID report- Responding Climate Change in New York State (ClimAID) - NYSERDA

FEMA- National Flood Hazard Layer | FEMA.gov
NOAA- National Storm Surge Risk Maps - Version 3 (noaa.gov)

Department of Agriculture Forest Service Wildfire Risk to Communities
EPA Climate Change Indicators in the United States
EPA Climate Resilience Evaluation & Awareness Tool (CREAT) | U.S. Climate Resilience Toolkit

EPA National Stormwater Calculator
National Integrated Drought Information System U.S. Drought Portal
National Interagency Coordination Center National Interagency Fire Center
National Oceanic and Atmospheric Administration Coastal Services Digital Coast

- Resources to help communities assess coastal hazards, such as the Sea Level Rise Viewer for visualizing community-level impacts of flooding or sea level rise and downloadable LIDAR data National Oceanic and Atmospheric Administration National Centers for Environmental Information website

National Oceanic and Atmospheric Administration Sea Level Trends
National Weather Service Climate Prediction Center
National Weather Service National Hurricane Center
National Weather Service Sea, Lake, and Overland Surges from Hurricanes (SLOSH)
National Weather Service Storm Surge Hazard Maps
U.S. Federal Government Climate Resilience Toolkit: The Climate Explorer
U.S. Army Corps of Engineers Climate Prepardness and Resilience
U.S. Geological Survey Coastal Change Hazards Portal
U.S. Geological Survey Landslide Hazards Program
U.S. Geological Survey National Ground-water Monitoring Network Data Portal
U.S. Geological Survey National Climate Change Viewer
U.S. Geological Survey National Water Dashboard
U.S. Geological Survey StreamStats
NYS Department of State- Assess | Department of State (ny.gov)

NYSERDA NY Costal Floodplain Mapper- Home Page (ny.gov)

NYSDEC Costal Erosion Hazards- Coastal Areas Regulated By The CEHA Permit Program - NYDEC

NYSDOH Heat Index- health.ny.gov/environmental/weather/vulnerability_index/county_maps.htm

APPENDIX O

REMEDIAL SITE OPTIMIZATION REPORT

REMEDIAL SITE OPTIMIZATION REPORT

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